Model 842-PE

Hand-held Optical Power/Energy Meter

User's Manual

Newport®

Experience | Solutions

Warranty

Newport Corporation warrants that this product will be free from defects in material and workmanship and will comply with Newport's published specifications at the time of sale for a period of one year from date of shipment. If found to be defective during the warranty period, the product will either be repaired or replaced at Newport's option.

To exercise this warranty, write or call your local Newport office or representative, or contact Newport headquarters in Irvine, California. You will be given prompt assistance and return instructions. Send the product, freight prepaid, to the indicated service facility. Repairs will be made and the instrument returned freight prepaid. Repaired products are warranted for the remainder of the original warranty period or 90 days, whichever is longer.

Limitation of Warranty

The above warranties do not apply to products which have been repaired or modified without Newport's written approval, or products subjected to unusual physical, thermal or electrical stress, improper installation, misuse, abuse, accident or negligence in use, storage, transportation or handling. This warranty also does not apply to fuses, batteries, or damage from battery leakage.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE. NEWPORT CORPORATION SHALL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM THE PURCHASE OR USE OF ITS PRODUCTS.

First printing 2007

This manual has been provided for information only and product specifications are subject to change without notice. Any change will be reflected in future printings.

Newport Corporation
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P/N: 90001049 D/N: 45501 REV B

Declaration of Conformity

We declare that the accompanying product, identified with the CE mark, complies with requirements of the Electromagnetic Compatibility Directive, 200489/108336/EEC and the Low Voltage Directive 73/23/EEC.

Model Number: 842-PE Power Meter

Year CE mark affixed: 2007

Type of Equipment: Electrical equipment for measurement, control and laboratory use

Manufacturer: Newport Corporation

1791 Deere Avenue

Irvine, California 92606

Standards Applied:

Compliance was demonstrated to the following standards to the extent applicable:

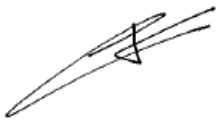
BS EN61326-1: 1997+A1+A2 +A3 "Electrical equipment for measurement, control and laboratory use – EMC requirements"

This equipment meets the CISPR 11:2006+A2 Class A Group 1 radiated and conducted emission limits.

BS EN 61000-3-2:2001, Harmonic current emissions, Class A

BS EN 61000-3-3:2002, Voltage fluctuations and flicker

BS EN 61010-1:2001, 2nd Edition "Safety requirements for electrical equipment for measurement, control and laboratory use"



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Newport Corporation Calling Procedure

If there are any defects in material or workmanship or a failure to meet specifications, promptly notify Newport's Returns Department by calling 1-800-222-6440 or by visiting our website at www.newport.com/returns within the warranty period to obtain a **Return Material Authorization Number (RMA#)**. Return the product to Newport Corporation, freight prepaid, clearly marked with the RMA# and we will either repair or replace it at our discretion. Newport is not responsible for damage occurring in transit and is not obligated to accept products returned without an RMA#.

E-mail: rma.service@newport.com

When calling Newport Corporation, please provide the customer care representative with the following information:

- Your Contact Information
- Serial number or original order number
- Description of problem (i.e., hardware or software)

To help our Technical Support Representatives diagnose your problem, please note the following conditions:

- Is the system used for manufacturing or research and development?
- What was the state of the system right before the problem?
- Have you seen this problem before? If so, how often?
- Can the system continue to operate with this problem? Or is the system non-operational?
- Can you identify anything that was different before this problem occurred?

Safety Information

Do not use the 842-PE if the instrument or the detector looks damaged, or if you suspect that the 842-PE is not operating properly.

Appropriate installation must be done for water-cooled and fan-cooled detectors. Refer to the specific instructions for more information. The user must wait for a while before handling these detectors after power is applied. Surfaces of the detectors get very hot and there is a risk of injury if they are not allowed to cool down.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, it is suggested to try to correct the interference by taking one or more of the following steps:

- Reorient or relocate the receiving antenna.
- Increase the distance between the equipment and receiver.
- Connect the equipment to an outlet that is on a different circuit than the receiver.
- Consult the dealer or an experienced radio/TV technician for help.

SYMBOLS

The following international symbols are used in this manual:

Refer to the manual for specific Warning or Caution information to avoid any damage to the product.

DC, Direct Current

Table of Contents

List of Illustrations

1 General Information

1.1 Introduction

To obtain the full performance from the 842-PE, we recommend that you read this manual carefully.

The 842-PE hand-held optical meter is a microprocessor-based power and energy meter that uses the latest technology to provide a multitude of options in a user-friendly environment. It is a complete power and energy meter, providing the user with everything from statistical analyses to data logging. It allows the user to store up to 50,000 data points in its internal memory. When a detector is connected to the instrument, its specific model type and calibration information is downloaded into the meter, enabling the appropriate measurement ranges and units of measure. When connecting a 818E-xx-xx-F fast energy dectector, the 842-PE enters into the metallic mode to ensure proper measurements. The 842-PE also has improved performance in joulemeter mode that enables 2 additional lower measurement scales.

The 842-PE firmware can be updated over the internet by connecting the USB or the RS-232 port to a personal computer. The instrument's enhanced network capabilities take further advantage of the USB and RS-232 ports for data acquisition and remote control. It can transfer data files to a PC for more sophisticated data analysis and respond to commands through the PC interface. The CD included with this meter contains LabVIEW drivers that will transform your PC screen into a virtual 842-PE. While having a copy of LabVIEW installed on your PC is required in order to use this CD, LabVIEW is not needed for programming the instrument in general. See Section 3 for communication with a computer.

Easy software and firmware upgrades

Keep in touch with the latest improvements to our user-friendly software. You can download the latest software and firmware versions anytime from our website www.newport.com and install it on the 842-PE with the serial interface. You will find all the necessary information on downloading and upgrading in Section 6.2.

1.2 Unpacking

Each Newport 842-PE hand-held optical meter is thoroughly tested and calibrated prior to shipment.

Visually inspect your 842-PE after removing it from the shipping container. If you see any damage, retain all packaging materials and shipping receipts. Any damage claim should be made promptly to the transportation company. Notify the nearest Newport representative concerning the claim, so that any repair or replacement can be arranged as soon as possible.

1.3 Parts List

The following is a list of parts included with the 842-PE Handheld Power Meter. Please make sure everything is present before discarding packing materials.

- 842-PE hand-held meter
- 842-BAT battery pack (installed in 842-PE)
- Power supply / battery charger
- USB cable
- Software (CD)
- User Manual (CD)
- Start-Up Guide

1.4 General Specifications

The following specifications are based on a one-year calibration cycle, an operating temperature of 18ºC to 28ºC (64ºF to 82ºF) and a relative humidity not exceeding 80%.

General Specifications 842-PE

Digital Display	76.78 x 57.58 mm LCD, 240 x 160 Pixels
Display Rate	3 Hz numeric display 15 Hz bar graph & needle display
Bar Graph	165 divisions
Data Displays	Real time, Line plot, Histogram, Statistics, Digital tuning needle
User input correction factors	2 multipliers and 2 offsets (7 digits floating point)
Analog Output	0 – 1 volt, full scale, ± 1%
Computer Interfaces	USB and RS-232[1]

[1] USB cable included. RS-232 cable sold separately (part number 842-CAB).

High throughput serial frequency	Up to 200Hz, with a 310 ms delay between burst for Metalic or XLE joulemeters, whereas 45 to 78 ms for MB joulemeter and power heads..
Dimensions (without stand)	230mm (W) x 122mm (H) x 44 mm (D)
Weight (with stand)	0.52 kg
Battery Pack	4 rechargeable 1.2 V Ni-MH AA
Battery Life	11 hours, 6 hours with backlight
Battery Charge Time	6 hours
Universal Power Supply	Input: 100/240 VAC 50-60 Hz, Output 9 VDC 1.66 A

Power Meter Specifications

Power Range	1 nW to 10 kW
Low Power Scales **(with 918D and 818-Series detectors)**	10nW, 30nW, 100nW, 300nW, 1µW, 3µW, 10µW, 30µW, 100µW, 300µW, 1mW, 3mW, 10mW, 30mW, 100mW, 300mW, 1W, 3W
High Power Scales **(with 818P Series detectors)**	30mW, 100mW, 300mW, 1W, 3W, 10W, 30W, 100W, 300W, 1kW, 3kW, 10kW
Resolution (digital)	5 µW on the 30 mW scale
Meter Accuracy	±0.5 % ±5 µV full scale[2]
Response Time (accelerated)[3]	1 sec
Sampling Frequency	200 kHz
Statistics	Current value, Max, Min, Average, Std Dev., RMS stability, PTP stability, Time

Energy Meter Specifications

Energy Range	1µJ to 20 kJ
Energy Scales	100µJ, 300µJ, 1mJ, 3mJ, 10mJ, 30mJ, 100mJ, 300mJ, 1J, 3J, 10J, 30J, 100J, 300J, 1kJ, 3kJ, 10kJ, 30kJ
Resolution (digital)	50 nJ
Accuracy[4]	1.0 %±50 µV < 500 Hz 2.0 %±50 µV 500 Hz to 1.2 kHz 3%±50 µV 1.2 kHz to 6 kHz (MT mode) 6%±50 µV 6kHz to 10 kHz (MT mode)
Default Trigger Level	2 %
Software Trigger Level	0.1% to 99.9%, 0.1% resolution Metallic mode : hardware set to 3%.
Repetition Frequency	3 kHz in acquire data, no missing point 2 kHz in statistics mode, no missing point 3-10 kHz in acquire data, ignores all laser pulses for 333us after laser pulse detection.
Statistics	Current value, Max, Min, Average, Std Dev., RMS stability, PTP stability, Pulse #, Repetition Rate, Avg Power
Data Storage	50,000 points[5]

[2] The 5µV bias can introduce an error into low power measurements when using the 818-series Low Power Detectors. It is essential to use the Zero Offset to rezero the 842-PE before making a measurement in these conditions. It is always good practice to use the Zero Offset. See section 2.2.
[3] Varies with individual detector (see 818P Series Detector Manual).
[4] Including linearity.
[5] Up to 225,000 if not using any advanced features that require memory.

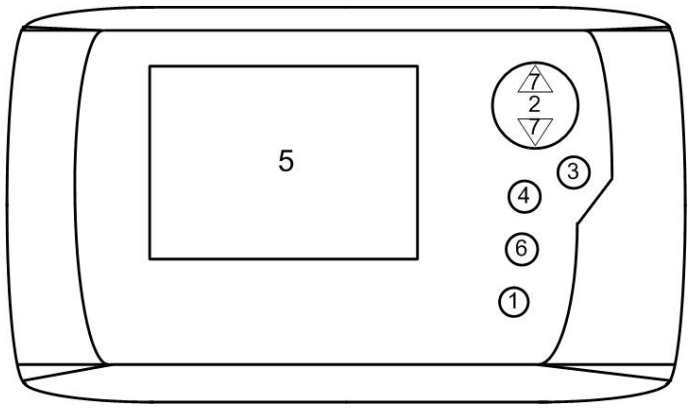

Fig. 1-1 842-PE Front Panel

1.5 Front Panel Description

1.5.1 I/O and Backlight Control Key

The I/O key has two functions:

842-PE on and off

Pressing the I/O key quickly when the 842-PE is OFF turns the 842-PE ON (do not hold the I/O key). To turn off the 842-PE, press and hold the I/O key a few seconds. To prevent battery leakage and to increase battery life, we recommend turning off the 842-PE when not in use.

Backlight control

With the 842-PE ON, pressing the I/O key very quickly switches the LCD screen **Backlight ON or OFF**. If you are working without the external power supply, turn the backlight off for longer battery life.

1.5.2 ←, ↑, →, ↓ Arrow Keys

The Arrow keys allow the user to browse through the menus. Press the **Right** Arrow key until you reach your desired option. To go backwards, press the **Left** Arrow key.

When you are not in the Menu, the Arrow keys function as quick access keys:

UP and Down keys: Increase or decrease the scale selection after correction factor has been entered (Note: entering a correction factor disables the auto scale).

Left key: Set or reset a zero offset.

Right key: Activate the custom wavelength keypad.

1.5.3 ENTER Key

The ENTER key selects the highlighted option.

1.5.4 Menu Key

The Menu key gives access to the MENU BAR.

1.5.5 LCD Screen

76.8 x 57.6 mm Liquid Crystal Display Screen, 160 X 240 pixels.
Press the shift key and use the **Up** and **Down arrow** keys (↑ ↓) to decrease and increase the LCD screen contrast.

1.5.6 Shift Key

The Shift key provides access to additional quick access keys:.

Shift-key right : activate the attenuator for photodiode heads.

Shift-key left : open the data sampling settings menu.

Shift-key up: decrease the contrast level.

Shift-key down: increase the contrast level.

Shift-key menu: open the statistic menu.

1.6 Top Panel Description

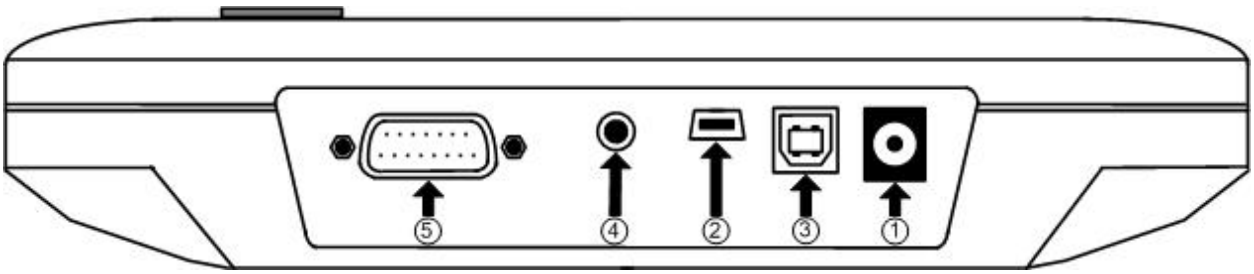

Fig. 1-2 842-PE Top Panel

1 EXTERNAL POWER SUPPLY INPUT JACK:

The input jack is for connecting the AC wall-plug power supply provided with the instrument. battery charger supplied with the instrument. When using the power supply, the internal battery pack is also being charged, for use of the instrument without the power supply. Input voltage required: 9 VDC/800 mA.

⚠	**CAUTION** **Permanent damage may occur to the optical meter if an external**

	power supply other than the Newport PM-PS9 (200960A) is used. Please call Newport Corporation if extra power supplies are needed for a particular setup.

2 SERIAL INTERFACE CONNECTOR (RS-232):

This interface allows remote control and data transfer between the 842-PE and a computer, a terminal, a printer or any device that has a serial communication port.

3 USB INTERFACE CONNECTOR:

This interface allows remote control and data transfer between the 842-PE and a computer that has a USB communication port.

4 0 to 1 VOLT ANALOG OUTPUT:

For monitoring laser average power or energy by using external equipment such as a chart recorder, a computer with an analog interface, a voltmeter, etc.

In the case of a power measurement, the output signal represents the amplified and anticipated power detector response.. In the case of an energy measurement, the output signal is a DC voltage representing the pulse energy value.

The 1 V value corresponds to the full scale reading of the selected range. This will provide the best signal-to-noise ratio. The measured power or energy is then related to the output voltage and to the selected range in this manner:

$$Power = V_{output} \times \text{Max of Range selected}$$

$$Energy = V_{output} \times \text{Max of Range selected}$$

For example:

1.00 V corresponds to 10 Watt on the 10 W range

0.25 V corresponds to 2.5 Watt on the 10 W range

0.10 V corresponds to 30 milliwatts on the 300 mW range

Specifications:

Maximum output voltage:	1 V
Output impedance:	10 kΩ
Connector type:	Female 1/8” jack

5 PROBE INPUT JACK:

The 842-PE uses a DB15 female connector to mate with compatible Newport detectors. See section 2.2 for compatible detector list.

2 System Operation

This section contains important information concerning the installation and operation of the 842-PE.

When delivered, the 842-PE just needs the battery pack installed and it is ready foruse. Just insert a detector head in the Probe Input Jack (#5 in Figure 1-2) and press the I/O key. If the meter doesn't turn on, the battery pack may be drained. Please turn it off, plug in the charger and let it charge for several hours before attempting to use again.

2.1 Accessing the Menu Structure

The powerful CPU of the 842-PE, combined with the Windows™ CE operating system, provide easy and intuitive access to all of its functions. This user-friendly Windows™-based interface is controlled by four **Arrow** keys, an ↵ key (**Enter** key) and a **Menu** key . For users familiar with Windows™, it works as any Windows™ menu, with the **ALT** key being replaced by the **F** key.

Pressing the **F** key (see Figure 2-1) provides access at any time to the menu bar and, from there, to the five main menus. Use the **Left** and **Right** arrow keys to go from one menu to the next. The selected menu drops down to show its options. Use the **Up** and **Down** arrow keys to select the desired item from the menu. Once the desired item is highlighted, press the **Enter** "↵" key to activate the function. When a menu option has an arrow "▶" at the end, pressing **Enter** "↵" or the **Right Arrow key** "→"opens a submenu where you can select the function. For example, in the case of the **Setting** menu, first select **Corrections** with the **Down Arrow key**, followed by the **Enter** "↵" or the **Right Arrow key** "→" to access the submenu. Move to the desired option with the arrow keys and press the **Enter** "↵" key to activate.

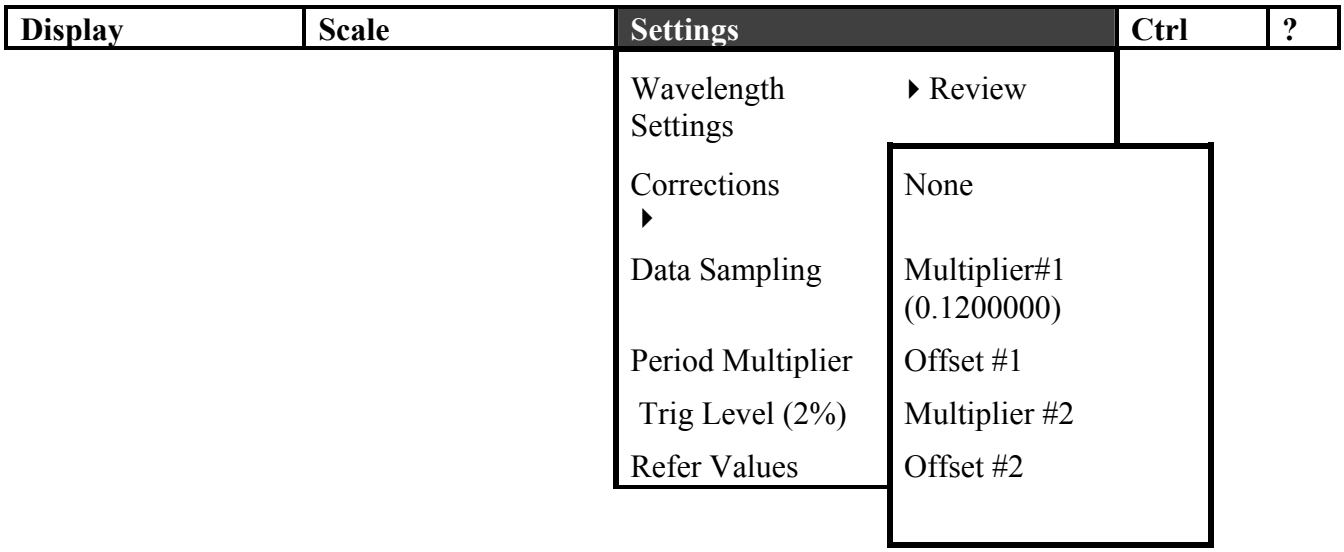

Fig. 2-1 The Menu Bar

Some menu options require additional information to be activated properly. In this case, a dialog box (see Figure 2-2) appears. There you enter the setting values of your choice. Use the **Arrow** keys to highlight a number and press the **Enter** "↵" key to select it. The selected number will appear in the upper box. Repeat the operation until the desired number has been fully entered. Then go to "OK" and press **Enter** "↵" to validate your number. You can correct a mistake by selecting the **Back** button (←) located in the bottom right of the dialog menu. Use the **Decimal** button (**.**) to enter decimals. The **Percent** button (%) gives you the flexibility to enter a value as a percent rather than a fraction. For example, you can enter the same multiplier as 0.925 or 92.5%.

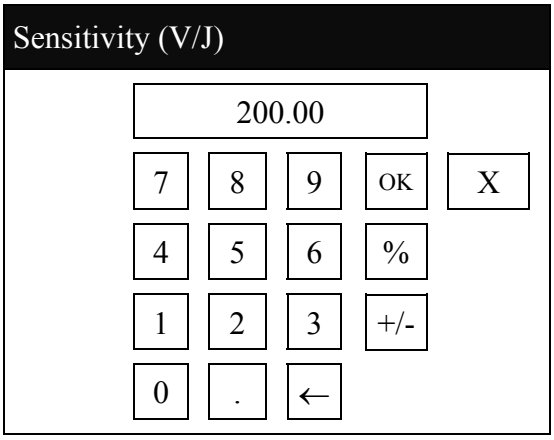

Fig. 2-2 The Dialog Box

2.2 Making a Measurement

This section will show you the fastest way of making a laser power and energy measurement with the 842-PE and a Newport power or energy detector.

The 842-PE Handheld Power and Energy Meter automatically recognizes all Newport low-power, high-power and energy detectors terminated with a15-pin connector. All calibration and technical data required for optimum operation of the detector will be automatically downloaded from the EEPROM in the DB15 connector. This data includes sensitivity, model, serial number, version, wavelength correction factors, and time response.

Quick power and energy measurement procedure:

1- Install the power or energy detector head on its optical stand.
2- **Turn the 842-PE off** and connect a compatible power or energy detector (see Table 1-2 below) to the 842-PE using the **PROBE INPUT JACK** (see Fig. 1-2). It is necessary to turn the 842-PE off before connecting a new detector in order to prevent any loss of information from the detector EEPROM and to read the detector EEPROM..

Detectors compatible with 842-PE Power and Energy Meter
818P Series High Power Detectors
818E Series Energy Detectors
918D Series Low Power Detectors
818 Series Low Power Detectors (with connector adapter)

Table 1-2. Detectors compatible with the 842-PE

3- Fasten the DB-15 thumbscrews.
4- Switch the 842-PE ON using the **I/O** key.
5- When using an 818-Series Low Power or 818P-Series High Power detectors, the 842-PE will default into power measurement mode. When using 818E-Series Energy detectors, it will default into energy measurement mode. The meter will also default to autoscale. If you are using an 818-Series Low Power detector, to obtain measurements in dBm, select Settings / Power Unit / dBm.
6- Remove the detector's protective cover and put the detector head into the laser beam path. Leave it there for a few minutes, until the detector has reached an equilibrium temperature. The entire laser beam must be within the sensor aperture. Do not exceed maximum specified power or energy densities. For the most accurate measurement, spread the beam across 60% to 80% of the sensor area.

NOTE:

Power detectors can be used with both CW and pulsed lasers.
Energy detectors can only be used with pulsed lasers.

Zero Offset Adjustment (steps 7 and 8). If using an 818P Series High Power Detector, proceed with step 7. If using a 918D Series or 818 Series Low Power Detector, go to step9. For 818E Series Energy Detectors, jump to step 11.

7- Block off laser radiation to the detector.
The power read by the 842-PE when no laser beam is incident on the detector may not be exactly zero. This is due to the fact that the detector is not thermally stabilized OR there is a heat source in the field of view of the detector when you turned on the 842-PE.
8- To reset the zero, wait until the reading has stabilized and select **Zero Offset** in the **Ctrl** (Control) menu. Then select **Rezero**. You are now ready to make an accurate measurement. To turn the **Zero Offset** off, select **Off**, to reselect the previous offset, select **Undo**.

Low Power Detector Zeroing:
9- To set a Low Power Detector to zero, select Ctrl / Set Diode Zero, and press the ↵ **Enter** key. A message appears requesting that you put the cover on your photodiode and then press the ↵ **Enter** key. The 842-PE passes through all the scales to determine the zero diode for each scale. The message "Diode Zero Done" appears when the 842-PE has determined the zero diode.

Notes:

- Refer to specific power detector documentation for complete installation and operating instructions.
- The 818P-series High Power Detectors are thermal sensors that are sensitive to temperature variations.

For high-precision measurements, it is recommended to:

- Allow the power detector temperature to stabilize before zeroing the 842-PE.
- Do not touch the detector head when handling the power detector. Touch only the stand.
- Avoid forced airflow or air drafts around the detector.

10- Apply the laser beam to the detector head.

11- The laser beam average power or energy will be displayed in three ways for your convenience (see section 2.3.1):
   a. Digitally for real time measurement.
   b. On a digital needle for an easy visualization of the laser beam power variation during laser fine-tuning.
   c. On a histogram to allow the laser beam's long-term stability to be evaluated.

2.3 Top Level Menu Structure

This section describes in detail the first group of menus essential to the 842-PE operation. Refer to Figure 2-3 for a schematic view of the menu structure. The menus differ depending on the type of detector that is currently being used. The **Display** menu lets you view your measurement in various ways. The **Scale** menu allows you to fix a specific measurement scale instead of autoscaling. Use the **Settings** menu during setup to select the best parameters for the measurement task at hand. These menus provide the flexibility needed to accommodate a wide variety of measurement conditions. The more active controls you are likely to use during your measurements are in the **Ctrl** menu. They are described in Section 2.3.4.

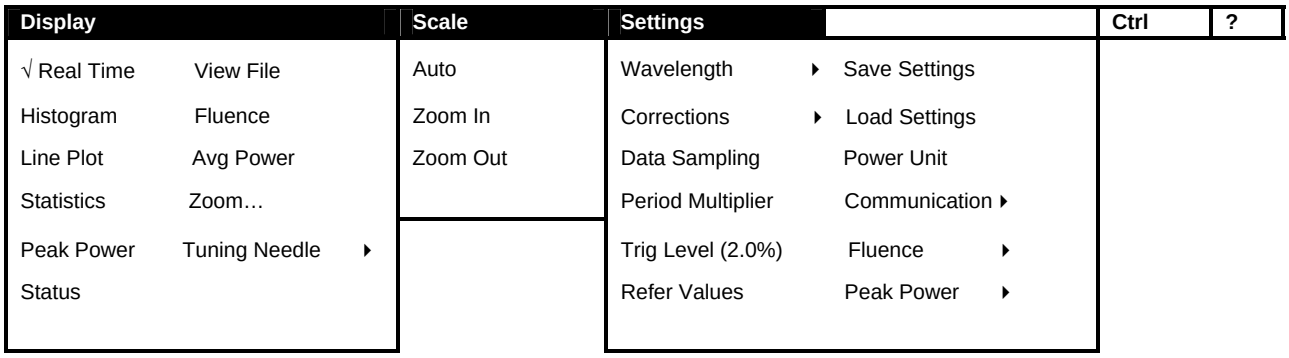

Fig. 2-3 View of the first group of 842-PE menus

2.3.1 Display Menu

The various displays offered by the 842-PE allow you to quickly view your measurement in several different ways. You will appreciate the easy-to-view high resolution 58 x 38 mm graphic, the LCD display and the backlight for use in poor ambient light conditions. The **Display** menu includes five options, (see Figure 2-3) that allow you to select the best way to display the measurement according to your specific needs. You can switch from one option to another without interfering with the measurements.

2.3.1.1 Real Time Display

This display is automatically selected when a detector is connected to the 842-PE. The top and bottom of the screen show important settings so you can see the conditions as well as the measurement (see Figure 2-4). The **Power** or **Energy** digital display is presented in giant format for easy reading in all conditions. Directly below, the **Bar Graph** display, as wide as the screen, presents the measurement in an analog format, very useful for rapidly varying values. Displayed on the upper left part of the screen is the **Detector Model**. Under the Bar Graph is the current **Scale**. At the bottom of the screen the leftmost box contains the actual power or energy received by the head before any correction factors are applied. The center box gives the resolution and the rightmost box displays the wavelength. The resolution is the smallest increment that the current value may change on a given scale. The wavelength value tells you what NIST-based calibration factor is currently being used. You can find the factors on the Calibration Report (for Low Power Detectors) or the *Personal Wavelength Correction*™ certificates (for High Power and Energy Detectors) that are shipped with your detector.

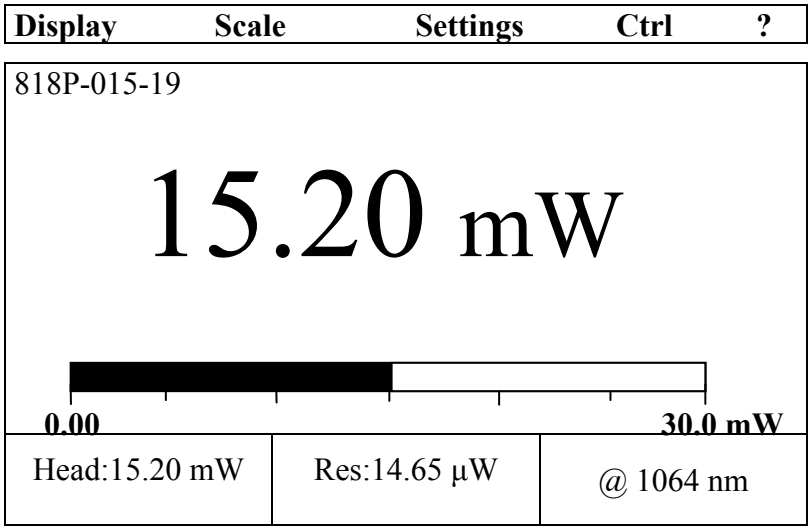

Fig. 2-4 Real Time Display

With an 842-PE, you can also choose either the high resolution mode for the most significant digits available, or the standard resolution to filter out unimportant fluctuations in measurement. This is a setting in the control (**Ctrl**) menu of the 842-PE.

2.3.1.2 Histogram Display

The histogram option gives a quick look at the laser beam's long-term stability and trends. The histogram adds new data points at a rate of 3 Hz and is dynamically scrolled to the left for each new point as soon as it reaches the right side of the screen.

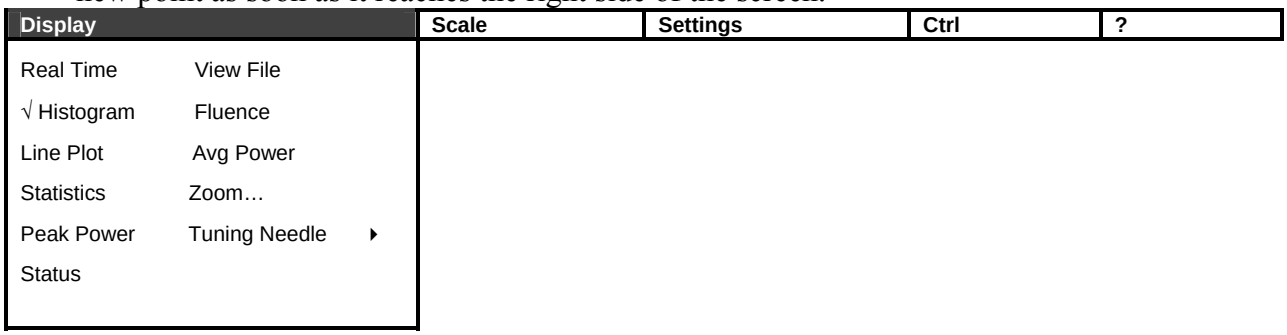

Fig. 2-5 Display Options Menu

2.3.1.3 Line Plot Display

The line plot also shows the trends in your data. Actual values are sometimes easier to read than with the Histogram.

2.3.1.4 Statistics Display

In Statistics display mode, the statistical analysis screen pops-up on top of the Main display. This screen (Figure 2-6) gives a complete statistical analysis of the measured data. See Section 2.3.3.3 for a detailed description of each parameter. Select the **Start** button to start or restart the data sampling and statistical calculations. Use the **Stop** button to stop the data sampling and statistics before you reach the end of the selected sampling time. The last statistical values calculated remain on screen so you can view them later, even if you close and reopen the Statistics window. To set the data to zero, select **Reset**. To restart the data sampling, select **Start**. The **Close** button closes the statistics window so you can see the Main display again but does not interfere with the statistics being computed. The data sampling and statistical calculations continue with this window closed or open, and are independent of the display you select. You can open and close the statistics display window to check on the statistics as often as you like.

The values in this display provide an additional digit of resolution to allow you to benefit from the improved precision of large samples. You must understand your sample size well enough to know if this additional digit is significant.

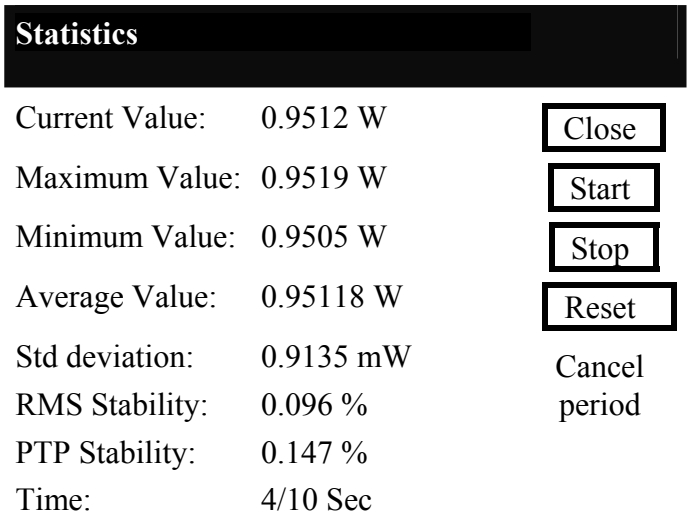

Fig. 2-6 Statistics Display

2.3.1.5 Peak Power Display

In the Peak Power display mode, the pulse energy measurement of the energy mode is converted to its peak power (Watts) and is inversely proportional to the pulse length. This function is active only in energy mode. The user must enter the pulse width, from picoseconds to milliseconds units using Setting/Peak Power in the Settings menu.

2.3.1.6 Status Display

The Status Display mode shows all the major adjustable parameters currently active for the detector head in one convenient place (see Figure 2-8).

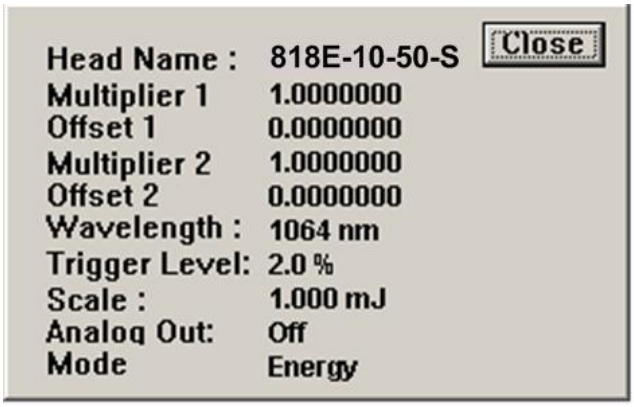

Fig. 2-7 Status display

2.3.1.7 View File

The View File mode allows you to view data previously acquired. Choose between standard (Std) notation and scientific (Sci) notation.

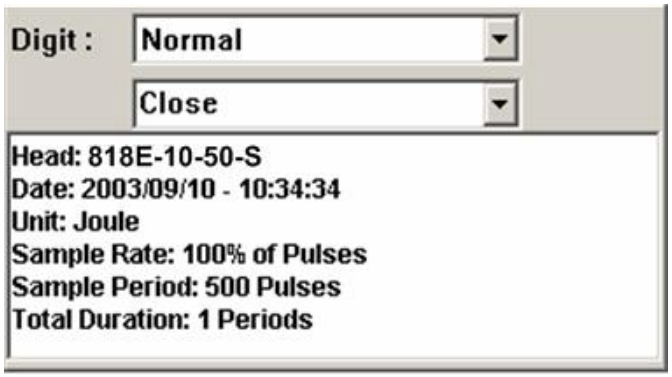

Fig. 2-8 View File screen

2.3.1.8 Fluence

In the Fluence display mode, the energy or power measurement is converted into energy density (J/cm^2) or into power density ($Watts/cm^2$) and is inversely proportional to the surface area of the beam. This function is active only in the energy and power modes. The user must enter the beam size, see **Settings/Fluence** in the Settings menu.

2.3.1.9 Avg Power.

In the Average display mode, the energy or power measurement is the average value defined in the data sampling menu. You can change your data sampling to your desired average time or number of points for Energy measurement. To activate the average display go into the **Ctrl Menu select Stat mode** then **select Start**.

.

2.3.1.10 Zoom

In the Zoom display mode, you can adjust the display scale of the line plot display or the histogram display. When zoom is selected, move the first vertical line using the up/down key, then select **Enter**. Move the second vertical lines then select **Enter**. If you want to exit the zoom option, press **the Enter key** two times. To disable the zoom, reselect **zoom** in the display menu.

2.3.1.11 Digital Tuning Needle Display

When you select the **Tuning Needle**, a graphical interface shows a real-time digital needle. The deflection of the digital needle is proportional to the real-time measurement. The 15 Hz refresh rate makes it an excellent tool for laser tuning and alignment.

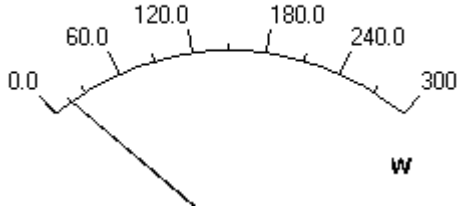

Fig. 2-9 Digital Needle Display

2.3.2 Scale Menu

The scale can be set to the automatic scaling mode (Auto mode) or to a specific fixed scale, which depends upon the specific detector head, using the arrow keys on the keypad. Once the Newport detector has been automatically identified from the detector head's EEPROM (done at boot-up of the 842-PE), the scale menu available for that particular detector is the only one available. Upon changing detectors, and re-booting, a different scale menu will be available. Figure 2-10 shows the scale menu for an energy detector.

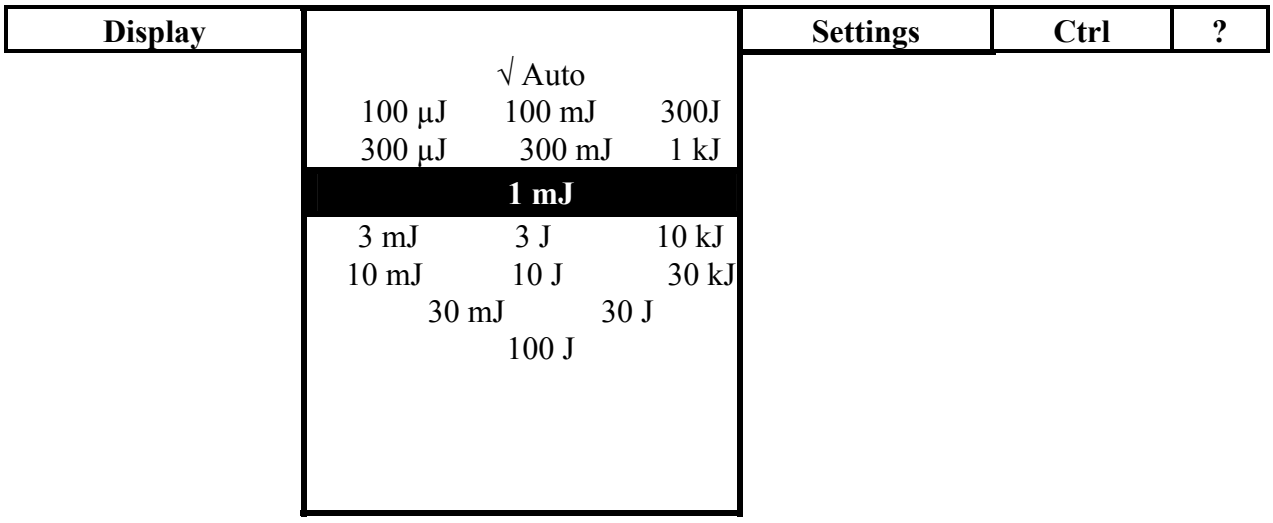

Fig. 2-10 Scale menu

The **Scale Menu** is used to select the signal level read with a detector head. When a new detector is connected, the autoscale is the default option. In this condition the 842-PE automatically selects the best scale for the value being measured.

The checkmark beside the scale number shows the currently selected scale. To change the scale, simply select a scale value from the appropriate range. The 842-PE only shows scale values that fall within the detector head's range.

When in a manually selected scale, you should always use the next higher scale to the measured value, for maximum precision.

Special care must be taken in the case of widely varying pulse energy to ensure that every pulse is detected. Contrary to the case of a power measurement where the autoscale adjusts continuously to the measured value, the autoscale in energy mode bases its scale selection on the energy of the previous pulse. A pulse with energy less than 2% of the energy of the previous pulse will not be detected. To avoid this problem, set the scale manually to a lower level. In this case, you measure this lower level when the higher energy pulses are saturated.

2.3.3 Settings Menu

Options in the **Settings menu** define user-adjustable acquisition parameters. All correction factors that will affect the reading can be easily programmed. That could be for a beam sampler, attenuator, or other optics that require you to multiply and/or add offsets to the detector reading. You can also adjust for a wavelength other than the calibration wavelength. A custom correction

factor can also be keyed in. Pre-programmed wavelength correction factors dedicated to each detector head are also available and automatically loaded from the detector EEPROM. Data Sampling and Trigger Level, as well as the commands for saving and loading your settings are also found in the Settings menu.

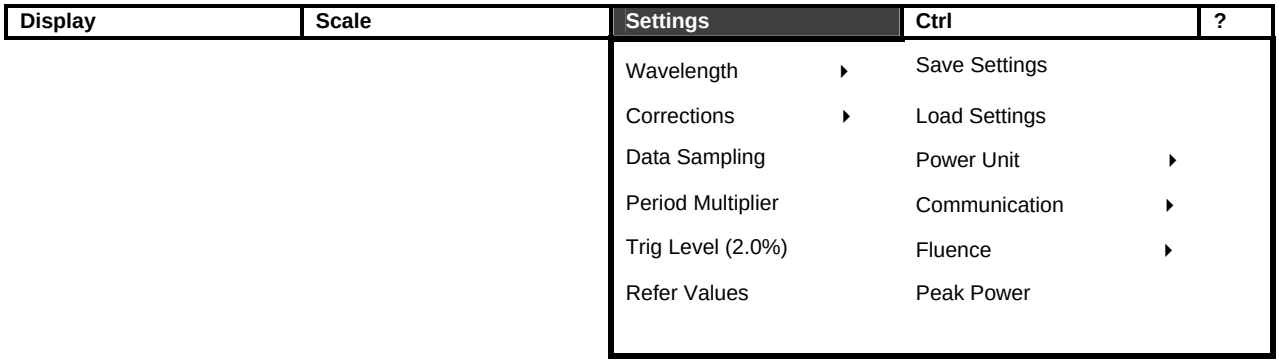

Fig. 2-11 Settings menu

2.3.3.1 Wavelength Setting

The Wavelength menu is used to select the proper wavelength for the detector, based on the light input. It applies a correction to adjust for the variation in responsivity at different wavelengths. When a new detector is connected to the meter, and the meter has been re-booted, the calibration wavelength is the default selection.

The checkmark beside the wavelength shows the current selection. To change the wavelength, select an appropriate wavelength from the Wavelength menu. The 842-PE only allows you to choose values that fall within the detector's range. If you select or enter a value that is not valid, an error message appears and the 842-PE automatically selects the default value.

When working at a wavelength not available in the Wavelength menu, use the custom option in that menu and enter the wavelength you need. The wavelength you enter must be within the range of valid wavelengths for the detector used. The 842-PE interpolates a wavelength correction factor using the pre-programmed data in the detector's EEPROM.

2.3.3.2 Corrections Setting

The user can apply up to 2 Multipliers (or Correction Factors) and 2 Offsets to the detector reading. Correction factors are most useful when sampling a percentage of a powerful laser beam or correcting for absorption along an optical path. The menu displays the values of correction factors that are being applied to the measurements**.** They may also be viewed in the **Display Status menu** (see Figure 2-8).

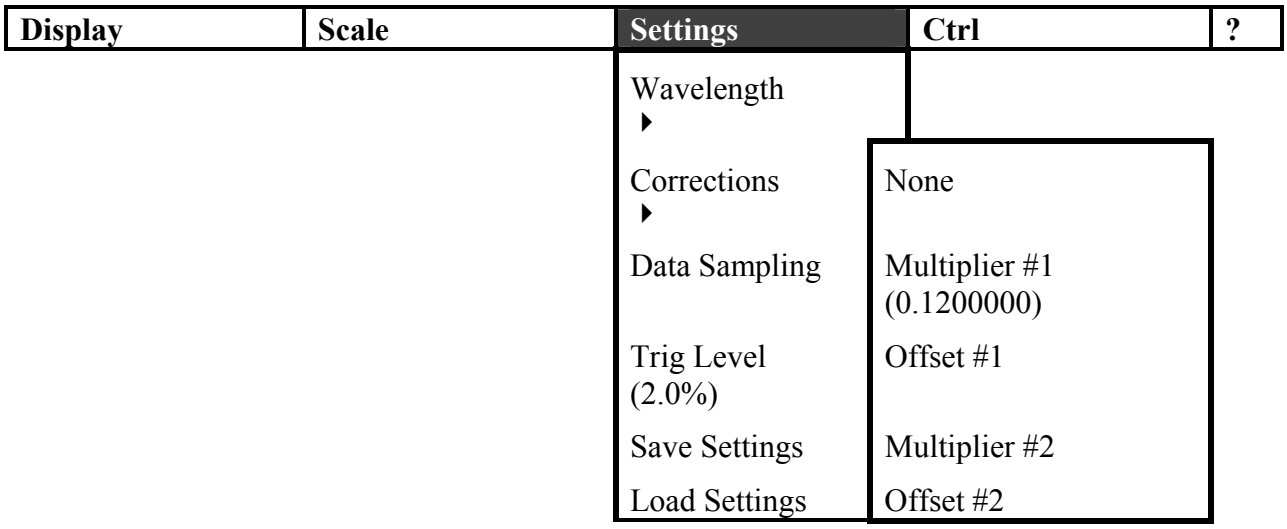

Fig. 2.12 Settings/Corrections menu

To activate the correction factor, select **Corrections** in the **Settings Menu** and then select Multiplier or Offset. A dialog box opens where you enter the correction value in percentage or in absolute value. This number will then multiply, or add, to the actual measured value to calculate the corrected value. The 842-PE will then display the corrected value.

For example, if you are measuring a laser beam passing through the 99.9% back reflector of a laser (giving $1/1000^{th}$ of the real value), choose **Multiplier #1** and enter 1000 in the dialog box. The 842-PE will display the laser's actual power rather than the measured 0.1% sample on the main display.

The corrections are applied mathematically in the order shown in the menu. Therefore, to apply an offset before a multiplier you would enter a value for Offset #1 and a value for Multiplier #2 and leave Multiplier #1 at the default value. The default value for the multipliers is 1, and the default for the offsets is 0.

When a correction factor is active the "Head" value will be different from the displayed measurement. The Head value is displayed at the bottom left of the screen. The corrected measurement appears in the center of the screen (see Figure 2-4).

It is also essential to make sure that the actual measured value complies with the power and energy limits of the detector head. The Autoscale option is the default selection. You can select a specific scale but it must always be based on the actual physical measured value and **not on the corrected values**. Of course, the displayed values and the display scale selection are then calculated to take into account the correction factors.

Note that the **Statistics** are computed for the corrected values only.

To disable the correction factor, re-select the Correction Factor (multiplier, offset) in the **Corrections submenu** of the **Settings menu**. Then select **None** in that submenu.

2.3.3.3 Data Sampling Settings

The 842-PE can display a complete statistical analysis of power or energy measurements. The Data Sampling menu is used to set up the data sampling parameters for calculating the Statistics. You have complete control over the data sampling. Use the defaults or select your own sample rate, sample period, and the time period or number of points over which the statistics are to be performed. The 842-PE can be set to either calculate the statistics for a single sample and stop, or to repeat continuously. Data can be collected for a few seconds or a few weeks. You have the flexibility to handle any application, from analyzing a single short pulse with high resolution to sampling performance over a period of months.

Selecting the **Data Sampling mode** in the **Settings menu** opens a Dialog Box where you enter the sample rate, the sample period, total duration, and the time stamp, if required.

The statistics being captured and calculated can be monitored by simply selecting **Statistics** in the **Display** menu. You can switch back to any other display mode without affecting the measurement or the statistics. You can also click the **Reset** button in the display to clear all the statistical parameters and start all over again by selecting the **Start** button. In order to have a good frequency accuracy with the Metallic joulemeter types (818E-xx-xx-F), you must at least make a 2 second statistical analysis. The statistical parameters that are calculated are listed in Table 2.1.

Table 2.1. Statistical Parameters

Statistical Parameters	Power	Energy	Definition
Current value	√	√	Value of the most recent measurement
Maximum value	√	√	Highest value in the sample period, E_{max} or P_{max}
Minimum value	√	√	Lowest value in the sample period, E_{min} or P_{min}
Average value	√	√	Rolling average of values in the sample, E_{avg} or P_{avg}
Standard Deviation	√	√	A measure of the spread of the data around the average.

			$STD=\sqrt{\frac{\sum_{i=1}^{n}(E_i-E_{avg})^2}{n-1}}$, $STD=\sqrt{\frac{\sum_{i=1}^{n}(P_i-P_{avg})^2}{n-1}}$
RMS stability	√	√	Root mean square stability represents the standard deviation as a percent of the average. $RMS=\frac{STD}{E_{avg}}\times 100$, $RMS=\frac{STD}{P_{avg}}\times 100$
PTP Stability	√	√	Shows the spread between the highest and lowest point in the sample as a percent. $PTP=\frac{E_{\max}-E_{\min}}{E_{avg}}\times 100$, $PTP=\frac{P_{\max}-P_{\min}}{P_{avg}}\times 100$
Time	√		Time elapsed since beginning the sample.
Pulse #		√	Number of the last pulse added to the sample.
Repetition Rate		√	Frequency of pulses coming from the laser, *PRR*
Average Power		√	Power calculated from the pulse energies and repetition rate. $P_{avg}=E_{avg}\times PRR$

To **Activate the Statistics,** select **Statistics** from the **Ctrl** menu, and then select **Start** in the submenu.

The 842-PE starts compiling statistics on your measurements as soon as the Statistics mode is activated. Select **Stop** in the same submenu to turn the Statistics mode off. When you stop the statistics, the last values remain in the statistics display window for you to view later. If you click **Start** again, the 842-PE will resume the statistics from that point, compiling the new measurements with the previous. Click **Reset** and all the statistical parameters will be cleared and set to zero. If you click **Reset** without stopping, all the statistical parameters will be cleared and the statistics will begin from zero automatically.

Alternative: From the **Display** menu, select **Statistics** to enter the statistics display window. The same commands are available there as buttons. Selecting the **Close** button closes the window but does not turn off the Statistics mode or interfere with the calculations. Selecting the **Stop** button

stops the calculation of new statistics but does not close the window so that you can review the final values.

The 842-PE uses default sample parameters unless you set them yourself.

To **View the Statistics,** select **Statistics** from the **Display** menu.

To **Set the Data Sample Parameters,** select **Data Sampling** from the **Settings** menu**.**

Figure 2-13 shows the window for setting the data sampling parameters. Use the → RIGHT arrow key to move through the parameters and units windows. Move to the one you want to set. Then use the ↑↓ UP and DOWN arrow keys to change the value. If you want to enter a value that is not available using the up and down arrow keys, then press the ↵ **Enter** key instead. The keypad data entry dialogue box shown in Figure 2-2 will pop up to allow you to enter a custom value. When you are finished, use the → RIGHT arrow key to select the CLOSE box and press the ↵ **Enter** key. Table 2-2 defines the various parameters.

The key points to remember whether using a High Power or Energy Detector are:

Sample Rate	Controls how fast you collect data.	Ex. 10 points/second or 50% of pulses
Sample Period	Controls how much data the statistics are computed for.	Ex. 5 minute or 1 day averages
Total Duration	Controls how long the 842-PE will acquire data and/or do statistics.	Ex. 1 period, 5 hours or 1000 pulses

Often the Total Duration and Sample Period will be the same but the 842-PE gives you the flexibility for any application. For example, with the 842-PE you can see 5 minute averages of your laser performance as you check it during the day and have it stop and hold the last 5 minutes worth of statistics after 20 hours.

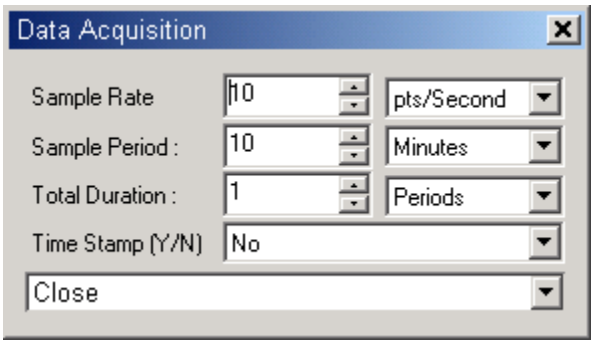

Fig. 2-13 Data sampling parameters window

Table 2.2 Data Sampling Parameters

PARAMETER	Choices	Description	Default
Sample Rate	Integers 0 to 100 custom value 0 to 300	Sets the time between each sample. Specify it as a number of points per unit of time. (F*or example, for 1 second between samples, set to 60 points per minute)*	10 (Power) *0 (Energy)*
Sample rate units	pts/Second pts/Minute pts/Hour pts/Day	Sets the time period for the number of points entered above. Maximum is 100 points/second, Minimum is 1 point/day. Time between samples = 1/(sample rate)	pts/Second
% of Pulses Sampled **Energy only**	Integers 0 to 100	Sets the fraction of the incoming pulses sampled for the statistics calculations and data recording.	*100 (Energy*)
Sample Period	Integers 0 to 100 custom value 0 to 300 time units **or** 0 to 100,000 points	The time over which samples are to be averaged. Sets the number of samples used in the average and standard deviation *(For example, for each average to be based on 5 minutes of data, set to 5 minutes).* This is also the time period displayed by the Histogram and Line plot.	10 (Power) *500 (Energy)*
Sample period units	Second Minute Hour Day Week Points	Sets the time period for the value entered above. Maximum is 300 weeks or 100,000 points Minimum is 1 second or 1 point	Minute (Power) *Points (Energy)*
Total Duration	Integers 0 to 100 custom value	The time period for which samples are reported (to the display and output). Select a time period or a number of points (F*or example, report statistics for 24 hours).* Often the total duration	1

	0 to 300 time units **or** 0 to 100,000 points	and sample period will be the same. The 842-PE automatically clears and recalculates the statistics at the end of each sample period unless you manually stop it.	
Total Duration units	Continuous Periods Weeks Days Hours Minutes Seconds	Sets the time period for the value entered above. To make the statistics stop after one sample period, select "1" and "Period." Maximum of 100 "periods" can be as high as 100 weeks. Minimum is 1 second.	Period
Time Stamp	Yes No	To have a **time stamp** appear with the data and go directly to the exit mode, select "yes" by pressing the down arrow key until "Yes" appears on the screen, then press the right arrow key. Selecting "Yes" writes a time stamp with each data point. This is a relative time stamp that always begins with zero. Using the time stamp facilitates data analysis but consumes more memory, thus limiting the total number of data points that can be taken. To set the **Time Stamp**, press the down arrow key until "Yes" appears on the screen, then press the **Enter** key. The "set 842-PE time" dialog box appears. Set Date: To set the date, use the right and left arrow keys to select the date in the format M D Y. The **UP arrow** adds units while the **DOWN arrow** subtracts units. To return to the Time dialog box, press the Menu key. Set Time: To set the time, use the **right** and **left** arrow keys to select the time (hours or minutes) using the 24 hour clock. The **UP arrow** adds units while the **DOWN arrow** subtracts units. Press the **Enter** key to validate the selection. The 842-PE time will remain as long as the battery lasts. To save your selection, press **Done**.	No
Exit Mode		The user must make a selection here in order to exit the data sampling parameters input window. To close, select **Close** and press Enter.	Close

	Close Close & start Statistics Close & Start Acquisition Close & Start Both	To calculate the statistics, select the **Close and Start Statistics** option, and press Enter. To save the acquisition parameters and activate the data sampling, select the **Close and Start Acquisition** option, and press Enter. The 842-PE begins storing data in memory. To calculate the statistics and save the raw data to memory at the same time, select the **Close and Start Both** option.	

2.3.3.4 Period Multiplier

The period multiplier applies to the graph. It multiplies the period by the number entered. For example, if the original period is ten minutes and you enter two, then the period will change to twenty minutes. **Use the period multiplier when using High Power Detectors only.**

2.3.3.5 Trig Level Setting

The **Trigger Level** only functions if an Energy Detector is connected or if a High Power Detector is used in **Single Pulse Energy (Energy mode)** mode. This option allows the user to change the trigger level to something other than the 2% of full-scale default value. This proves to be especially useful in noisy environments. Acceptable values range from 0.1% to 99.9%. Caution should be taken when choosing a lower trigger level than the 2% default value in a high noise environment.

To change the trigger level value, access the dialog box by selecting **Trig Level** from the **Settings** menu and enter the desired number in percent or in decimal form. The 842-PE will not detect pulses with a value under the Trig Level. Be careful to select a scale that is close to the measured value if the Trig Level is high.

The value of the trigger level is shown on the side of the **Trig level** menu, confirming that it is activated to a specific user level.

Selecting a high value for the trigger level may cause problems with the detection of widely varying energy values when in the autoscale mode. The autoscale function uses the energy level of the last pulse to set the scale level. Therefore it will not detect the next pulses if they are lower than the trigger level. As a result, the autoscale may become caught on a high scale value. To solve this problem, select a lower value for the trig level, change the scale manually or reset the autoscale by reselecting autoscale in the Scale menu. With the metallic joulemeters (818E-xx-xx-F types), the trig level is set to 3%

and cannot be change. If you inadvertently trigger on noise, change to a higher scale.

ERRATIC TRIGGERING?

For a few detector heads, in electrically noisy environments, it is possible that the 842-PE will inadvertently trigger on the noise. In that case, increase the trigger level to 3% or higher if necessary.

It is always good practice to reduce electrical noise generation or shield the detector and meter when measuring very low pulse energies.

2.3.3.6 Reference Values

Comparisons of your power measurements to certain user-defined reference values are easy to make. If your current measurements lie within your established **Upper** and **Lower bounds**, then they meet the standards. If they go above or below the bounds, then there could be a quality problem, which triggers a fail message. The Reference Values option has two modes: **Threshold** mode and **Pass/Fail** mode.

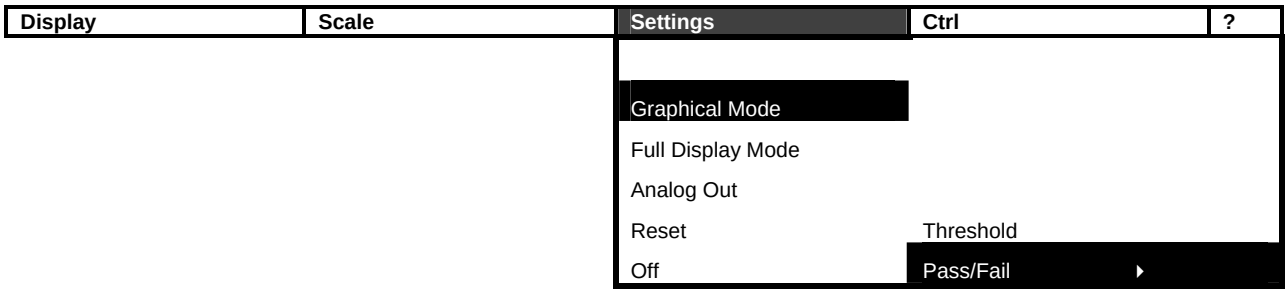

Fig. 2-14 Pass/Fail menu

Threshold mode: Use this mode to set or change the upper and lower bounds, reference values and to restore the last values. To set or change a setting, use the arrow keys and scroll to Set Upper Bound, Set Lower Bound, Close, Set Reference Values, or Restore Last Values. Highlight your choice and press the ↵ **Enter** key. You may select **Upper Bound** only, **Lower Bound** only or both.

Pass/Fail / Graphical mode: View the line plot on the screen with the limits that you selected. If the current power increases to a point above the upper (or lower) bound, "**FAIL**" appears on the screen.

To reset a failed experiment, press the Menu button to see the menu. Scroll to **Settings / Refer Values / Pass/Fail / Reset**, and then press the ↵ **Enter** key. "Pass" appears on the screen as the default. It only changes to "fail" if the current power triggers it.

Pass/Fail Full Display mode: Use this mode to see if the current power passes or fails. The default is "pass". If the current power rises above the threshold or falls below it, you will see "fail". In the **Full Display Mode** select **Settings / Refer Values / Pass/Fail** to see the screen display "pass" or "fail". To get to the Menu Bar, press the Menu key.

Analog Out: The analog out mode can be used at the same time as the graphical mode or full display mode. Use the Analog Out option to view the voltage with a voltmeter or with an oscilloscope. The range of the output is 0 to 1 Volt. When the voltage increases about the upper limit and "fail" is displayed, the voltage rises. When the voltage is between the threshold limits the graph is displayed and the voltage remains constant.

2.3.3.7 Save and Load User Settings

The 842-PE can remember and recall selected settings. This option is activated under the **Save Settings** or **Load Settings** menu items. The display contrast setting is also saved using this option. The saved display contrast is automatically restored the next time the 842-PE is turned on. All the other parameters are automatically loaded only when the same head is connected to the 842-PE.

2.3.3.8 Power Unit

The **Power Unit** display option allows you to select between dBm and Watts. This option is available only in photodiode mode, when using low power 918D Series or 818 Series detectors..

2.3.3.9 Communication

The Communication option allows you to change the baud rate of the serial port, so that the 842-PE can communicate with your computer. You need to know the baud rate of your computer. The possible baud rates are:

115200
38400
19200
9600

2.3.3.10 Fluence

The fluence display mode will give you the energy density in joules per square centimeter (J/cm^2) or the power density in watts per square centimeter (Watts/cm^2). Using this setting, the user must enter the surface area of the beam at the detector surface in square centimeters or enter the beam diameter in centimeters for a round beam.

2.3.3.11 Peak Power

In energy mode, the Peak Power display mode is used to convert a pulse energy measurement to its peak power value in watts. The user must enter the pulse width. Units from picoseconds to milliseconds are available.

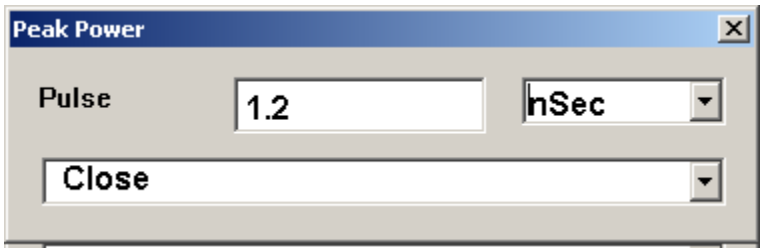

Fig. 2-15 Pulse Width setting for the Peak Power mode

2.3.4 Control Menu

This section gives a complete description of the last group of menus and options available on the 842-PE in the **Control** and **Help** menus. You can refer to Figure 2-16 at any time for a schematic view of the advanced menu structure.

2.3.4.1 Zero Offset

This function subtracts the current power reading on the display, at the moment the command is selected with the ↵ **Enter** key, from all subsequent measurements. Subsequent measurements will be relative to this zero power level. The main purpose of this option is to remove measurement errors caused by either thermal noise (in the case of high power detectors), or ambient light levels (in the case of photodiodes), in the environment of the detector. This can be caused by the fact that the detector has not been thermally stabilized OR there was a heat or light source in the field of view of the detector when the 842-PE was turned on (for example, the hand or body of the user). Use this function once your detector has achieved thermal equilibrium to ensure accurate measurements.

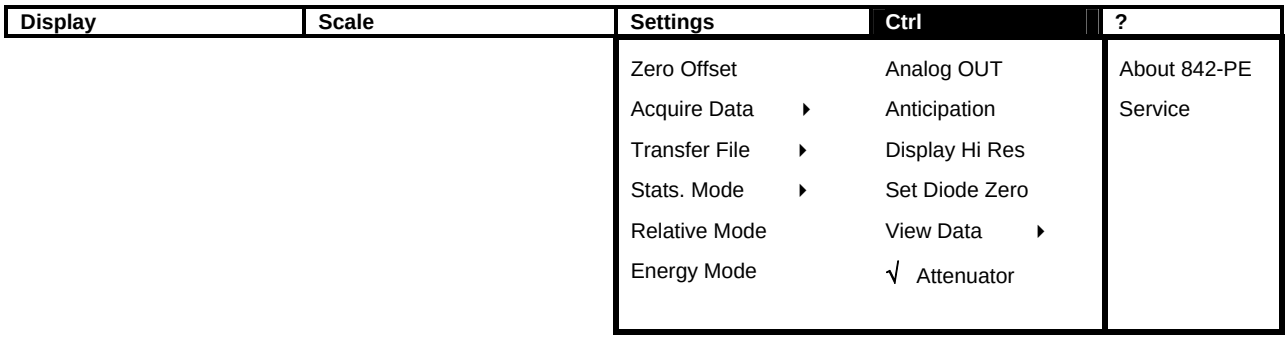

Fig. 2-16 View of the Ctrl Menu Structure

For instructions on the proper way to adjust the offset to zero your detector see steps 8-10 in Section 2.2.

This feature is only available when using High Power Detectors.

2.3.4.2 Acquire Data

When you select **Start**, the 842-PE begins storing data according to your Data Sampling settings (see Section 2.3.3.3 and Table 2.2). Those settings will control the rate at which memory is used. The **Stop** command halts the data recording but the 842-PE will continue to provide measurements to the display.

The 842-PE records the data in volatile RAM memory. Data in this memory is lost when the 842-PE is turned off. Select **Save Data in Flash** to save the data in the FLASH memory to keep it after the 842-PE is turned off. You can also select **Restore Data from Flash** to transfer data from the FLASH back to the RAM memory. This feature is useful when you want to keep the data in the 842-PE until it can be transferred to a computer at a later time or another location.

2.3.4.3 Transfer File

This option allows you to send a data file stored in the **842-PE's RAM** memory to a computer through the RS-232 or USB port.

Establish a HyperTerminal connection between the PC and the 842-PE. (see Section 3.2 if necessary.) You will be able to view transferred data in the HyperTerminal window.

To record data as a file on a PC: At the top of the HyperTerminal window, go to the **Transfer** dropdown menu and execute the following sequence.

Transfer → Capture text → enter a filename[6] **→ Start**

After you have Started and Stopped a data acquisition or restored the data from Flash memory on the 842-PE, select **Data Transfer** in the Ctrl menu or send the serial command ***FDL 0** from the PC. This will send your data to the PC.

Return to the **Transfer** drop down menu in the HyperTerminal window.

Transfer → Capture text → Stop

The data is now in the file you named, in text format, with linefeed separated values. If you used a time stamp, the second column data is tab delimited.

Using the data has never been easier. If you drag the icon of your file onto the Excel icon or an open Excel spreadsheet, your data will automatically be put into the first one (or two) columns of a new spreadsheet. You can also open your file from within Excel. Just click **Finish** on the first screen of Excel's Text Import Wizard when it pops up. You can also copy and paste the data from your file into other files and applications.

2.3.4.4 Statistics Mode

Use this option to activate the statistics computations. Select **Start** in the submenu and the 842-PE will start compiling statistics. Select **Stop** in the same submenu to turn the Statistics mode off. When you stop the statistics, the last values remain in the statistics display window for you to view later. If you click start again, the 842-PE will resume the statistics from that point compiling the new measurements with the previous. Click **Reset** and all the statistical parameters will be cleared and set to zero. If you click **Reset** without stopping, all the statistical parameters will be cleared and the statistics will begin from zero automatically. These same controls appear as buttons in the Statistics Display window. The default when you power up the 842-PE is off.

2.3.4.5 Relative Mode

Relative mode is similar to **Zero Offset** but it displays the measurement as a percent difference from the value on screen when this option is selected. The reading will become zero the same as with **Zero Offset** but when the power changes it will be displayed as a percent value.

This is useful for monitoring variations in laser power. For example, in a quality assurance application the user may just want to make sure the power does not vary more than 5% over a certain time period to qualify a system. If the laser power is 40W when this is selected, a laser power of 38 W would be shown as -5%. To do this same task in power units you would select **Zero Offset** when the laser is at 40 W and 38 W would display as -2 W. Refer to

[6] Recommendation: use the **Browse** button to select the directory and folder you want the file in. Enter the file name in that window and click **Save**.

Zero Offset above. This command is a toggle so a checkmark indicates when it is on. Select it again to turn it off. The default is off.

√ **Relative mode**	Relative mode is ON
Relative mode	Relative mode is OFF

2.3.4.6 Energy Mode

This function allows you to measure the energy contained in a single pulse with an 818P-Series High Power detector head. This mode of operation gives access to the same options as when using an 818E-Series Energy detector. The only restriction is that the time delay between pulses, $Delay = \left(\frac{1}{Rep.\ Rate} \right)$, must be more than three times the time constant of the detector. (Please refer to the instruction manual for the specific detector you are using.)

The scale must be manually selected because the Autoscale is deactivated when in Energy Mode.

This command is a toggle so a checkmark indicates when it is on. Select it again to turn it off. The default is off.

Keep in mind that high power detectors are optimized to sustain high average power, not high peak energy. **Always keep the energy density below the maximum energy density quoted in the manual for that specific detector.**

The single pulse energy measured in Energy Mode is precise to ±5% of the power measurement calibration. This is larger than the uncertainty in the power measurement (typically ±2.5%) because the energy calibration is computed from the power measurement calibration. A precision of ±3% in the single pulse energy measurement can be achieved if the power detector head is specifically calibrated to measure in single pulse energy mode. Please contact your local Newport distributor or nearest Newport office for more information on obtaining a single pulse energy measurement calibration.

2.3.4.7 Analog OUT

This function turns the analog output on and off. This command is a toggle so a checkmark indicates when it is on. . The default is off.

This output allows the monitoring of the laser average power or energy with external equipment such as an oscilloscope, a computer with an analog interface, a voltmeter, etc.

The output signal represents the amplified and anticipated power detector response in the case of a power measurement. In the case of an energy measurement, the output signal is a DC voltage representing the pulse energy value.

In order to improve the signal to noise ratio, the 1 volt value corresponds to the full scale reading of the selected range. The measured power or energy is then related to the output voltage and to the selected range according to the following equations:

$$Power = V_{output} \times Range$$
$$Energy = V_{output} \times Range$$

For example, an output of 0.4 Volts on the 30 W scale corresponds to 12 Watts of laser power. If on the 10 W scale, then 0.4 Volts signifies 4 Watts.

2.3.4.8 Anticipation

Use **Anticipation** to deactivate the power meter acceleration software that provides the "anticipation" response. By using advanced algorithms and known properties of the detector, this software allows the 842-PE to provide a very accurate power measurement a few seconds faster than the natural response of a thermopile power detector. It accelerates the natural response by a factor of 5 to 10.

Turning off the anticipation will result in a slower response but it can provide a more stable measured value in a noisy environment.

A checkmark shows when it is activated. It is a toggle switch so select it to change it between off and on. The default is on.

2.3.4.9 Display Hi Res

This menu item is a toggle switch that turns on and off a higher precision display mode. It will increase the value displayed numerically on the screen by one significant digit especially for relative changes in power or energy. Absolute accuracy depends on the detector head.

2.3.4.10 View Data

Use **View Data** to transfer a file in the notation you would like to see it in: scientific or standard. To transfer the file in scientific notation select Ctrl / Sci Notation. To transfer the file in standard notation, select Ctrl / Std Notation.

2.3.4.11 Attenuator

This on/off toggle function is only activated when using a 918D Series or 818 Series Low Power detector. It allows the user to select whether the attenuator

is “on” or “off”. When attenuator “on” is selected, the “ ATT “ indicator will appear on the main display next to the detector model number.

2.3.4.12 Set Diode Zero

This menu item is to make a zero offset on all the scales available. To set the zero offset on all scales of a Low Power Detector, select Ctrl / Set Diode Zero, and press the ↵ Enter key. A message appears requesting that you put the cover on your photodiode and then press the ↵ Enter key. The 842-PE passes through all the scales to determine the zero diode for each scale. The message “Diode Zero Done” appears when the 842-PE has determined the zero diode.

2.3.5 “?”

This menu contains any help and service information available for this version of the 842-PE firmware. That includes “About 842-PE” to identify the firmware version currently loaded in the instrument as well as contact information for Newport service. Future help, FAQ, and detector head information will appear here.

3 Computer Interfacing

3.1 Installation

The 842-PE comes with a USB cable, enabling communication via the USB interface. The instructions below assume you are running Windows 2000 or XP as the operating system. The easiest way to get up and running is to install the USB drivers first, before even connecting the USB cable. A special RS-232 cable is available separately (part number 842-CAB).

USE WITH PC ONLY

The software for the 842-PE is not compatible with a Macintosh computer.

Insert the Newport *842 Series Software* CD into your computer's CD-ROM drive. Navigate to and open the USB Driver Installer. Follow the on-screen instructions to complete the installation.

If you connect the USB cable to your PC before installing the USB drivers, then a window will open that says **Found New Hardware – USB Device** and after several seconds to a minute the **Found New Hardware Wizard** will appear. Cancel the wizard and execute the Auto installer "USB driver installer.exe" in the USB Driver folder from the CD-ROM.

At the end of this process, a new serial COM port will be added to the list of communication ports. It may be used like any other serial port. You will need to know the COM port number to set up the serial connection to the 842-PE (see section 3.2.1 below).

NOTE:

Although the 842-PE is equipped with both a mini-serial port and a USB port, they cannot be used at the same time. Only one port should be connected at a time.

3.2 Setup

3.2.1 COM Port Verification

To verify the USB installation and find the COM port number click:

Start → Settings → Control Panel → System → Device Manager

(Instructions may vary with operating system and version. For Win2000/XP there is an additional step between and System and Device Manager.)

Scroll down to **Ports (COM & LPT)** and double click that line. One of the options should be **Prolific USB-to-Serial Comm Port (COM#)**.

Note the COM port number. You will need it for the next step.

3.2.2 Establishing Communication

You may use any serial communications software that you are familiar with. The instructions given here are for HyperTerminal because it is widely available on PCs with Windows™. Select:

Start → Programs → Accessories → Communications → HyperTerminal

To save communication settings, enter a name for the connection. In the drop down menu for "**Connect using**" select the COM port noted above (Section 3.2.1). Select **OK**.

Input the following settings into the communications parameter window that appears next.

Bits per second	**115,200**
Data bits	**8**
Parity	**None**
Stop bits	**1**
Flow control	**None**

Click **OK** to begin entering serial commands in the HyperTerminal window.

TO ECHO COMMANDS

The commands you type will not appear in the HyperTerminal window unless you configure the HyperTerminal to do so. Only the response from the 842-PE will be displayed. If you prefer to see the commands you are typing in the HyperTerminal window, click the File menu and execute the following sequence:

File → Properties → Settings (tab) → ASCII setup → select "Echo typed characters locally" → OK

To test the connection, type ***VER** in the HyperTerminal window and press ↵ **ENTER**. If the response is the version of your 842-PE, you are successfully connected and ready to send serial commands.

3.2.3 HyperTerminal Settings Shortcut

When you end the session, HyperTerminal asks if you want to save your settings. To avoid inputting the communication parameters again in the future, save by clicking **Yes**. The next time you execute the string of commands shown in section 3.2.2 above, the name of your session will appear after HyperTerminal. Clicking on the session name will open the connection using the saved settings. To avoid re-entering the string of commands, put a shortcut to this file on your desktop using this procedure:

Search for the file name. Select the file. Right click and select Shortcut in the drop down menu.

3.3 Software

User-friendly communication software customized for the 842-PE is included on the CD that came with this instrument. It will be found in the folder labeled *PC Interface for 842-PE-V200*. Open this folder and double-click on setup.exe and follow the instructions given by the Installation Wizard.

Please visit our website for the most recent version (www.Newport.com). This software basically transforms your PC screen into a large 842-PE screen enabling you to control and see your information from a distance, while saving data. LabView™ drivers are also available to let you customize 842-PE applications on your PC. You can also upgrade the firmware on your 842-PE on the same web-page (see Section 6.2 for details).

4 Command Reference

4.1 Commands and Queries

The traditional serial communication interface also allows you to operate the 842-PE remotely. If no automated acquisition is involved (i.e. no programming), we recommend using the 842-PE Series Software on the included CD because it is very simple to use. In the case of automated data acquisition, controlled by other software, use the commands in Section 4.1.2 to control the 842-PE. These commands are divided into two groups: **Commands** and **Queries**.

Commands allow you to change the 842-PE's settings without using the 842-PE's keypad. Commands do not yield any data. The only response is a confirmation that the command has been executed.

Queries are used to retrieve data, or to obtain information on the current status of the 842-PE. They do not change the settings of the 842-PE, they just return the requested information.

When it receives a command, the 842-PE sends an acknowledgement of the command to the host device in the form of a short message describing the change that has been made.

4.1.1 Command Format

Commands or Queries may be sent as text strings (text mode) or numerical values (binary mode). The 842-PE automatically recognizes whether the received data is a text command or a binary command[7]. You are therefore free to send data in either form at any time. In this section we will only discuss text mode. All commands will receive one of two possible responses: data (for Queries) or ACK ("acknowledged" – for Commands).

All Commands or Queries must begin with an asterisk (*) and end with a Line-Feed <LF>, Carriage-Return <CR>, or both. All parameters must be separated by at least one space. The case is insensitive. Replies to Commands or Queries end with a Carriage-Return <CR> and Line-Feed <LF>.

[7] Binary programming should only be attempted by advanced programmers. For information on using binary mode, see **Appendix B – Binary Programming**.

Example	Command	Response from 842-PE
Turn on backlight	*BKL 1 <enter>	ACK <CR><LF>
Get data value	*CVU <enter>	Current Value: 0.001616 <CR><LF>
Check battery	*BAT <enter>	The Battery Power is Low <CR><LF>
Get Statistics	*VSU <enter>	Current Value: 0.002013 Maximum: 0.002011 Minimum: 0.000000 Average: 0.000001 Standard Deviation: 0.000048 RMS Stability: 7.181641% PTP Stability: 18.296875% Time: 455 Acquisition Time: 600 <CR><LF>

In case of an error, the reply string is in the following format:

Error X: reason [enter]

X is the error code, and **reason** is an explanation. See Chapter 5: Error Codes, for a detailed description of errors.

Because all replies end with a **CR** or **LF** (or both), a text reply contains tabulations when many elements need to be separated in the string. This is useful when exporting data to a spreadsheet.

4.1.2 Command Directory

DISPLAY COMMANDS

Command Name	Text Command	Description	Handle[8]
Set Display	SDU	Change on-screen display mode.	1157
Set Scale	SSA	Manually set scale.	1130
Set dBm Display	DBU	Toggle dBm unit on & off (Low Power Detectors only)	1159
Set High Resolution Display	SHL	Toggles additional significant figures to the displayed reading	1161

MEASUREMENT COMMANDS

DATA ACQUISITION

Query Current Value	CVU	Get the value currently displayed on the screen	1200
Query New Value Ready	NVU	Determine if new reading is available	1201
Query Statistics Data	VSU	Read statistics data	1202
Set Logging Start /Stop	LOG	Start storing data in meter (EEPROM)	1171
File Download	FDL	Retrieve a file stored in the meter	1172
Download points	CAU	Send the values in ascii to the serial port with the data sampling setting.	N/A

SETUP

Set Wavelength Correction	SWA	Specify the wavelength	1125
Set Attenuator	ATU	Toggles attenuator correction	1162
Set Multipliers	SMU	Set the value of the multipliers	1128
Set Offsets	SOU	Set the value of the offsets	1129
Query Data Sampling Settings	RDS	Get current data sampling parameters	1151
Configure Data Sampling	DSU	Set the data sampling parameters	1152
Set Trigger Level	TLA	Set the internal trigger level when measuring pulse energy	1112

MEASUREMENT CONTROL

Enable Statistics	ESU	Start, stop or reset the statistic calculations	1155
Set Energy Mode	SCA	Turn energy mode on or off	1160
Set Anticipation	EAA	Turn power measurement anticipation on or off	1123
Set Zero Offset	EOA	Zero the reading to remove noise	1120

INSTRUMENT AND DETECTOR INFORMATION COMMANDS

Query Version	VER	Get firmware version of the meter	1001
Query Detector Head Name	HEA	Get model name of the detector head	1100
Query Status	STA	Retrieve detector information and monitor settings	1005
Query Battery Power	BAT	Get state of remaining battery power	1006
Set Internal Clock	CLK	Adjust time and date of meter	1165

INSTRUMENT CONTROL COMMANDS

Set Backlight	BKL	Turn the display backlight on or off	1003
Set Analog Output	ANO	Enable or disable the analog output port	1150

COMMUNICATIONS COMMANDS

Test Communication	KPA	Test communication between meter and PC	1000
Init Serial Port	BRS	Change baud rate of the serial port	1004

[8] "Handle" in the far right column is for Binary Mode. It is given here for reference only. Ignore if using Text Mode.

4.2 Serial commands

4.2.1 Display Commands

4.2.1.1 Set Display

This command is used to change the device's on-screen display mode.

Text Command	Parameters	Return
SDU	Display Mode	ACK

Available display modes:
Parameter

0	Real-Time Display	Default display mode. It shows the current measured value.
1	Histogram	Shows a short history of the acquired data.
2	Statistic	Shows all data relevant to statistics.
3	Digital Needle	Provides a simulated analog needle.
4	Lineplot	Displays the data history as a line plot.

4.2.1.2 Set Scale

This command is used to force the display of the current data into a specific range. The lower range is always zero, and the higher ranges can be found in the table below. The Auto scale applies the best scale for the current values in real time. The parameter must be one of the identifiers in the table below. Remember that the serial protocol is not case-sensitive in text mode.

Text Command	Parameters	Return
SSA	Scale identifier or index	ACK

Scale Identifiers:

Text Mode	*Scale*
Auto	*optimum*
1p	*1 picowatt or picojoule*
3p	*3 picowatts or picojoules*
10p	*10 picowatts or picojoules*
30p	*30 picowatts or picojoules*
100p	*100 picowatts or picojoules*
300p	*300 picowatts or picojoules*
1n	*1 nanowatt or nanojoule*
3n	*3 nanowatts or nanojoules*
10n	*10 nanowatts or nanojoules*
30n	*30 nanowatts or nanojoules*
100n	*100 nanowatts or nanojoules*

300n	*300 nanowatts or nanojoules*
1u	*1 microwatt or microjoule*
3u	*3 microwatts or microjoules*
10u	*10 microwatts or microjoules*
30u	*30 microwatts or microjoules*
100u	*100 microwatts or microjoules*
300u	*300 microwatts or microjoules*
1m	*1 milliwatt or millijoule*
3m	*3 milliwatts or millijoules*
10m	*10 milliwatts or millijoules*
30m	*30 milliwatts or millijoules*
100m	*100 milliwatts or millijoules*
300m	*300 milliwatts or millijoules*
1	*1 Watt or Joule*
3	*3 watts or joules*
10	*10 watts or joules*
30	*30 watts or joules*
100	*100 watts or joules*
300	*300 watts or joules*
1k	*1 kilowatt or kilojoule*
3k	*3 kilowatts or kilojoules*
10k	*10 kilowatts or kilojoules*
30k	*30 kilowatts or kilojoules*
100k	*100 kilowatts or kilojoules*
300k	*300 kilowatts or kilojoules*
1meg	*1 megawatt or megajoule*
3meg	*3 megawatts or megajoules*
10meg	*10 megawatts or megajoules*
30meg	*30 megawatts or megajoules*
100meg	*100 megawatts or megajoules*
300meg	*300 megawatts or megajoules*

4.2.1.3 Set dBm Display

This command changes the on-screen display unit to dBm. This option is only available with the 918D Series and 818Series Low-Power Detectors.

Text Command	Parameters	Return
DBU	**1** to turn On, **0** to turn Off	ACK

Default: Off

4.2.1.4 Set High Resolution Display

This command is used to add significant digits to the on-screen reading.

Text Command	Parameters	Return
SHL	**1** to turn On, **0** to turn Off	ACK

Default: Off

4.2.2 Measurement Commands -- Data Acquisition

4.2.2.1 Query Current Value

This command is used to query the value that is currently being displayed on the device's screen. The value is displayed in Watts or in Joules (not in dBm).

Text Command	Return
CVU	Current value

For example, a 12 mW reading would be displayed like this:

Current Value: 0.012

4.2.2.2 Query New Value Ready

This command is used to check whether a new value is available from the device. Though optional, its use is recommended when used with single pulse operations.

Text Command	Return
NVU	Available/ Not Available <CR> <LF>

Example		Response from 842-PE
Text Command:	*NVU <enter>	New Data Not Available <CR> <LF>

Note that the **Query Current Value** and **Query Statistic Data** commands will return the current values from the device even if they have not been updated since the last query.

4.2.2.3 Query Statistics Data

This command is used to read all the statistics data, provided that the device has previously been set into statistic mode.

Text Command	Return
VSU	Statistics

All the data and relevant identifiers are formatted into a tab-separated string.

4.2.2.4 Set Logging Start/Stop

This command is used to log data on the 842-PE meter's EEPROM.

Text Command	Parameters	Return
LOG	**0** to Stop **1** starts a raw data acquisition **2** starts saving statistics **3** saves both raw data and statistics	ACK

This command begins or stops logging data in the device's volatile memory. This is done using the Data Sampling settings (sample rate, time, period...). If you do not want to use the Data Sampling default settings, you must use the DSU command prior to this one (or set the Data Sampling settings manually on the meter).

The Logging starts when the command is issued.

The log file created in the device can then be downloaded to a PC using the File Download (FDL) command, or it can be saved in the meter's EEPROM.

4.2.2.5 File Download

This command is used to retrieve a logged file from the device.

Text Command	Parameters	Return
FDL	File Sequence Number	File data

The file sequence number is required to select the file to be downloaded. Providing zero as a sequence number selects the most recently logged file. As soon as the command is issued, the file transfer begins. In text mode once the command is issued it is possible to start saving all received data until the terminator is received (the terminator is the character string "EOF" followed by a line feed).

The current version of the 842-PE can only hold 1 file in memory at a time. Only zero is accepted as a parameter. Look for updates on our website.

The file data is structured: Each record contains a tag that specifies what it contains:

TAG	Content of record
0	Raw Value
1	Time Stamp, Raw Value
2	average, max value, min value, ptp stability, RMS stability, standard deviation
3	average, max value, min value, ptp stability, RMS stability, standard deviation, average power

The following example is for a file 400 bytes long with timestamps, and containing a 20 char text header.

Example		Response from 842-PE
Text Command:	*FDL 0 <enter>	<File 0 data> … <"EOF"> <LF>

4.2.2.6 Download data

This command is used to send data to the serial port according to the data sampling setting. The maximum transfer speed is 200Hz.

Text Command	Binary Command	Parameters	Return
CAU	**N/A**	None	Data in ASCII

4.2.3 Measurement Commands -- Setup

4.2.3.1 Set Wavelength Correction

This command is used to specify the wavelength being used on the detector. The EEPROM in the 15-pin connector on the detector contains measured spectral data for a wide range of wavelengths. If the wavelength input by the user is different from the predefined list of wavelengths on the meter, a custom value is interpolated. Specifying zero as a wavelength or providing an out-of-bound value as a parameter restores the default settings. A valid value is set between the lowest and highest wavelengths supported by the device, and it must be an integer value.

Text Command	Parameters	Return
SWA	Wavelength	ACK

Default: Calibration wavelength (typically 1064 nm)

4.2.3.2 Set Attenuator

This command is used to adjust the processing of the meter with the readings of the detector, depending on whether the detector is using an external attenuator or not.

Text Command	Parameters	Return
ATU	**1** to turn On, **0** to turn Off	ACK

Default: Off

4.2.3.3 Set Multipliers

This command is used to set the value of the multipliers.

Text Command	Parameters	Return
SMU	Multiplier **1** (or **2**), <Multiplier value>	ACK

Default: 1

There are two multipliers and two offsets that are automatically applied in the following order:

Multiplier 1 → Offset 1 → Multiplier 2 → Offset 2

It is possible to modify the values of the multipliers by selecting (indexing) them in the first parameter (1 or 2) and entering a new value in the second parameter.

The following example sets multiplier 2 equal to 3.3.

Example	Response from 842-PE
*SMU 2 3.3 <enter>	ACK <CR> <LF>

4.2.3.4 Set Offsets

This command is used to set the value of the offsets.

Text Command	Parameters	Return
SOU	Offset **1** (or **2**), <Offset value>	ACK

Default: 0

There are two multipliers and two offsets that are automatically used in the following order:

Multiplier 1 → Offset 1 → Multiplier 2 →> Offset 2

It is possible to modify the values of the offsets by selecting (indexing) them in the first parameter (1 or 2) and entering a new value in the second parameter.

The following example sets offset 1 equal to 1.5 milli.

Example	Response from 842-PE
*SOU 1 0.0015 <enter>	ACK <CR> <LF>

The other option available is the Zero-offset. The Zero-offset operation is done first, before those of the Multipliers and Offsets.

4.2.3.5 Query Data Sampling Settings

This command is used to read the current data sampling settings

Text Command	Return
RDS	Sampling Settings info

A string is returned containing all of the data sampling settings.

4.2.3.6 Configure Data Sampling

This command provides the data sampling parameters for the logging and statistics environments. These settings are used when saving data on the device's data storage media, and also to process statistics.

Text Command	Parameters	Return
DSU	Sample Rate, Sample Rate Unit, Sample Period, Sample Period Unit, Total Duration, Total Duration Unit, Time Stamp(On/Off)	ACK

Defaults: See Table 2.2

Parameters:

Sample Rate	Integer value	Times per unit
Sample Rate Unit	0 = Seconds 1 = Minutes 2 = Hours 3 = Days 4 = percentage of pulses (energy only)	
Sample Period	Integer value	
Sample Period Unit	0 = Seconds 1 = Minutes 2 = Hours 3 = Days 4 = Weeks	At the end of a period, statistics are reset.

	5 = Pulses (energy only)	
Total Duration	Integer value	
Total Duration Unit	**0** = Sample Period(s) **1** = Seconds **2** = Minutes **3** = Hours **4** = Days **5** = Weeks **6** = Continuous **7** = Predefined number of points	May be a fixed amount of time or points, one or many periods, or non-stop.
Timestamp	**0** = Off **1** = On	Adds a time stamp for all logged data in the sample.

The following example sets a single data acquisition run for 90 minutes with timestamps at 4 hertz.

Example		Response from 842-PE
Text Command:	*DSU 4 0 90 1 1 0 1 <enter>	ACK <CR> <LF>

4.2.3.7 Set Trigger Level

This command sets the internal trigger level when using the device in energy reading mode.

Text Command	Parameters	Return
TLA	Trigger Level (percentage)	ACK

Default: 2%

The value should be set between 1 and 100 (floating point values are allowed). In text mode, you may add a "%" symbol after the value for clarity.

Example		Response from 842-PE
Text Command:	*TLA 15.4% <enter>	ACK <CR> <LF>

4.2.4 Measurement Commands -- Control

4.2.4.1 Enable Statistics

This command is used start, stop and reset the statistics calculating process on the data currently being acquisitioned.

Text Command	Parameters	Return
ESU	**0**, **1** or **2** (to Disable, Enable or Reset)	ACK

Default: Disable

Prior to enabling the statistics, the user should use the LOG1, LOG2 and LOG3 commands to setup the data logging environment.

4.2.4.2 Set Energy Mode

This command is used to toggle the Energy mode when using a high power detector.

Text Command	Parameters	Return
SCA	**1** to turn On, **0** to turn Off	ACK

Default: Off

4.2.4.3 Set Anticipation

This command is used to enable or disable the anticipation processing when the device is reading from a wattmeter. The anticipation is a software-reading acceleration algorithm that provides faster readings using the detector's calibration.

Text Command	Parameters	Return
EAA	**1** to turn On, **0** to turn Off	ACK

Default: On

4.2.4.4 Set Zero Offset

This command subtracts the current value from all future measurements the moment the command is issued to set a new zero point.

Text Command	Parameters	Return
EOA	**0** to turn Off, 1 to turn On, 2 to undo.	ACK

Default: Off

4.2.5 Instrument and Detector Information Commands

4.2.5.1 Query Version

This command is used to query the device to get information about the firmware version and the device type.

Text Command	Return
VER	Version number and device type.

Example		Response from 842-PE
Text Command:	*VER <enter>	842-PE Version 1.01 <CR> <LF>

4.2.5.2 Query Detector Head Name

This command is used to query the model of the current detector head.

Text Command	Return
HEA	Model of the current head

Example		Response from 842-PE
Text Command:	*HEA <enter>	818E-05-25-S <CR> <LF>

4.2.5.3 Query Status

This command is used to view data that is relevant to the current detector head.

Text Command	Return
STA	Current static and dynamic configuration values

Configuration values:

	Field name	Text Mode Data
1	**Head Type**	Indicates whether the current detector is an 818P, 818E, 918D or an 818 Series detector.
2	**Head Version**	Number identifying the version of the detector head
3	**Head Serial Number**	Alphanumeric string indicating the serial number for the head.
4	**Calibration Sensitivity**	Sensitivity at default wavelength, in V/W
5	**Default Wavelength**	Default Wavelength in nm
6	**Active Sensitivity**	Currently used sensitivity, it may have been modified by variables such as the Active Wavelength
7	**Active Wavelength**	Currently used Wavelength, in nm
8	**Scale Min Power (818P) OR Max Power (818E)**	818P: minimum scale index (see Set Scale command).

		818E: Maximum power supported by the detector (in Watts).
9	**Scale Max Power (818P) OR Max Energy (818E)**	818P: maximum scale index (see Set Scale command). 818E: Maximum energy supported by the detector (in Joules).
10	**Scale Min Energy**	Minimum scale index when reading energy
11	**Scale Max Energy**	Maximum scale index when reading energy
12	**Current Scale**	Currently used scale index (see the Set Scale command)
13	**Energy Mode**	Is the 818P being used in Energy mode? On/Off or N/A.
14	**Anticipation**	Is Anticipation enabled? On/Off or N/A
15	**External Trig**	Is the External Trig enabled? On/Off or N/A
16	**Trig Level**	Internal trigger level, specified as a percentage [1-100]
17	**Zero Offset**	Currently used offset (see Zero Offset command)
18	**Zero Offset Unit**	For Binary mode only
19	**Multiplier #1**	Value of the first multiplier
20	**Multiplier #1 Unit**	For Binary mode only
21	**Offset #1**	Value of the first offset
22	**Offset #1 Unit**	For Binary mode only
23	**Multiplier #2**	Value of the second Multiplier
24	**Multiplier #2 Unit**	For Binary mode only
25	**Offset #2**	Value of the second offset
26	**Offset #2 Unit**	For Binary mode only
27	**Currently Logging data**	Is the device saving data? Yes / No
28	**Analog Output**	Is the analog output enabled? Yes / No
29	**Resolution**	Resolution of the detector
30	**Resolution Divider**	For Binary mode only
31	**Currently Calculating Stats**	Are statistics enabled in the device? Yes / No
32	**High Resolution Display**	Does the device display more numbers after the comma? On/Off
33	**Min Wavelength**	From 0 to 19, this is an index for the Wavelength table
34	**Max Wavelength**	From 0 to 19, this is an index for the Wavelength table
35	**Upper Bound**	For the Pass/Fail test, this is the upper bound
36	**Upper Bound Unit**	For Binary mode only
37	**Lower Bound**	For the Pass/Fail test, this is the lower bound
38	**Lower Bound Unit**	For Binary mode only
39	**Reference Value**	For the Pass/Fail test, this is the Reference Value
40	**Reference Unit**	For Binary mode only
41	**Pass/Fail Status**	Is the Pass/Fail test active? On/Off

42	**Threshold**	Has the Pass/Fail test failed? Fail/Pass
43	**Autoscale query**	Indicates whether the meter is in Autoscale
44	**DBM query**	Indicates whether the meter is in dBm mode

4.2.5.4 Query Battery Power

This command is used to query the device's remaining battery power.

Text Command	Return
BAT	Low, Medium or High

Example		Response from 842-PE
Text Command:	*BAT <enter>	The battery power is High

4.2.5.5 Set Internal Clock

This command is used to adjust the time and date of the monitor's internal clock. This information is used to timestamp files when data logging.

Text Command	Parameters	Return
CLK	**day, month, year, hour, minute, second, AM/PM**	ACK

Day: 1 to 31

Month: 1 to 12

Year: 1970 to 2999

Hour: 0 to 23 (PM is assumed if over 12)

Minute: 0 to 59

Second: 0 to 59

AM/PM: 0 = Am, 1 = PM

4.2.6 Instrument Control Commands

4.2.6.1 Set Backlight

This command is used to turn the backlight of the device display on or off.

Text Command	Parameters	Return

BKL	**1** to turn On, **0** to turn Off	ACK

Default: Off

4.2.6.2 Set Analog Output

This command is used to enable or disable the output of the current value on the analog port of the meter.

Text Command	Parameters	Return
ANO	**1** to Enable, **0** to Disable	ACK

Default: Disabled

4.2.7 Communications Commands

4.2.7.1 Test Communication

This command is used to test communication with your 842-PE. The PC is communicating with the meter if you receive the ACK response.

Binary Command	Return
1000	ACK

4.2.7.2 Init Serial Port

This command is used to change the current baud rate of the serial port of the device. Valid parameters are 2400, 9600, 14400, 19200, 38400, or 115200. Upon receipt of the command the 842-PE sends an acknowledgement and then closes and restarts the serial port at the new speed (if the new baud rate is different from the current one). You must also change the baud rate of your own serial port.

Text Command	Parameters	Return
BRS	new baud rate	ACK

Default: 115200

5 Error Messages

#	Error	Comment
1	Command not found	Command is invalid.
2	Invalid Parameter	The parameter value is out of valid range, or not of expected type (text, numeric, flag).
3	Not Enough Parameters	The expected number of parameters should always be sent.
4	Head is not available	Verify that the detector's DB15 connector is fully engaged with the meter.
6	Scale setting not available for specified head	Refer to the Scale table in the Set Scale command.
8	No Data available	The current configuration cannot provide the requested data.
10	Analog output is not available with External Trigger	Cannot use the same connection for output and trigger at the same time.
11	Anticipation is not available	Make sure that the detector is in power-reading mode.
12	Statistics are not available	Statistics must first be enabled.
13	PWC is not available	Make sure that the detector head version supports Personal Wavelength Correction
14	Invalid Command: Too long.	The command must not be over 255 characters long.
15	Too many Parameters	The correct number of parameters must be sent to the device.
16	Invalid Baud Rate	Verify that the device supports the selected baud rate.
18	Energy mode is not available with current head	Energy Mode works only with 818P Series High Power Detectors.
20	Statistics are already enabled	Disable before re-enabling
21	No storage space left	Remove files from the storage media before logging new ones
22	Head is not a Joulemeter	Make sure the head is an Energy Detector.
23	Already logging data	Disable before re-enabling
24	File does not exist	In order to download a file, first run an acquisition, or load it from the EEPROM.

6 Maintenance

6.1 USB installation for the 842-PE

The 842-PE has a mini USB type B port. When connected to a PC it emulates a standard serial port. This means that it is possible to connect many 842-PE meters to one computer, without tying up the ordinary serial ports, while keeping a simple interface for which designing software is easy. The 842-PE can function using the USB port power only. It does not utilize the battery energy when linked to a computer through the USB port.

6.2 Free Software and Firmware Upgrades

Keep up-to-date with the latest version of the 842-PE software including new features and options. As new and improved versions of the device's firmware are created, it is in your best interest to update your 842-PE. The latest device firmware can be downloaded from the Newport website.

Access our website at www.Newport.com. Go to the 842-PE data sheet page . Click on the name of the 842-PE upgrade instructions file to open or download the instructions. You may want to print the instructions. Find the file that corresponds to your 842-PE and follow our simple, easy-to-use instructions.

In summary, you will download and execute the file by selecting it and pressing the return key, it will extract and start the Firmware Updater automatically. You will set the 842-PE in Update Mode by turning it off, and holding the → RIGHT arrow key while turning it on again. Make sure that the correct COM port is selected in the Firmware Updater. You can use the "Test communication with device" button to make sure that everything is well linked. If the device is correctly connected to the computer, simply press the "Update Device" button to start the upload. This should take a few minutes, after which you will need to turn off and restart the 842-PE. The upgrade instructions file contains more detailed step by step instructions for the procedure.

6.3 Battery Charging

As mentioned previously, the 842-PE meter is operated using four standard rechargeable Ni-MH batteries. When the **low battery** indicator shows on the lower right corner of the screen, recharge the batteries by connecting the

external power supply for six hours. The 842-PE can be either on or off during this procedure. One battery charge provides up to 7 hours of operation.

The 842-PE may not function properly when the battery level is very low. In that case, connect the power supply to the 842-PE to recharge the battery.

You can operate the 842-PE by plugging it into a USB port when the battery is low, or even removed, but it will not recharge. Recharging requires the external power supply.

7 Service Information

The Model 842-PE Hand-Held Power/Energy Meter contains no user serviceable parts. To obtain information regarding factory service, contact Newport Corporation or your Newport representative. Please have the following information available:

1. Instrument model number (842-PE)
2. Instrument serial number (on rear panel)
3. Description of the problem.

If the instrument is to be returned to Newport Corporation, you will be given a Return Number, which you should reference in your shipping documents. Please fill out a copy of the service form, located on the following page, and have the information ready when contacting Newport Corporation. Return the completed service form with the instrument.

To obtain warranty service, contact your nearest Newport agent or send the product, with a description of the problem, transportation and insurance prepaid, to the nearest Newport agent. Newport Corporation assumes no risk for the damage in transit. Newport Corporation will, at its option, repair or replace the defective product free of charge. However, if Newport Corporation determines that the failure is caused by misuse, alterations, accident or abnormal condition of operation or handling, you will be billed for the repair and the repaired product will be returned to you, transportation prepaid.

7.1 Service Form

Newport Corporation
U.S.A. Office: 800-222-6440
FAX: 949/253-1479

Name _____ **Return Authorization #**_____
(Please obtain RA# prior to return of item)

Company _____

Address _____ _____Date _____

Country _____ Phone Number _____

P.O. Number _____ FAX Number _____

Item(s) Being Returned:

Model # _____ Serial # _____

Description _____

Reason for return of goods (please list any specific problems):

_____

_____

_____

_____

_____

Notes:

Appendix A: Attenuator / Diffuser Calibration Procedure

Introduction

Newport's 818E-Series Energy Detectors are not normally calibrated with the 818E-DA-25/50 and 818E-DG-25/50 Attenuator/Diffusers. Therefore, to achieve accurate measurements, the **user** must perform a calibration. The calibration procedure is relatively simple. You will first make a measurement without the attenuator, and then with the attenuator. The ratio of these two measurements will be your correction factor.

Using the 842-PE Power & Energy Meter, make sure that the *Attenuator* setting in the *Control* menu **is not checked**. That is, it must be off. Otherwise, accessing the wavelength correction (*Settings* / *Corrections menus*) would be impossible.

Procedure

Step 1: Set up your energy detector to measure the energy of your pulsed laser. If you are working at a wavelength other than the calibrated wavelength, first make the proper correction by following the procedures given in Section 2.3.3.1 - Wavelength Setting. Make sure that the energy level is below the detector's damage threshold and your laser still has good stability.

Step 2: Apply energy for a few minutes to warm up the detector. This will reduce any thermal bias.

Step 3: Measure the energy level without the attenuator. To reduce random uncertainty you should average a number of shots. We recommend at least one hundred shots. This should reduce random errors by a factor of 10 (square root of N, assuming a Gaussian distribution).

Step 4: Install the attenuator. Without changing the laser settings measure the energy level by averaging the same number of shots. All laser settings must be the same as Step 3 (including beam size and position on the detector).

Step 5: Repeat the first measurement (Step 3) to make sure that nothing has changed during the procedure that would invalidate the calibration. A change larger than the uncertainty of your measurements means that something in the laser or environment has changed. You can either add this to your ± uncertainty when you use the attenuator or try to stabilize the laser and environment and begin again with Step 3.

The correction multiplier for the 842-PE will be given by:

$$T_f = \frac{\text{Reading without attenuator}}{\text{Reading with attenuator}} \qquad \text{(no units)}$$

Now use this calibration factor for the “Attenuator/Diffuser” when using it at the wavelength established in Step 1.

Appendix B: Binary Programming (for Advanced Programmers)

7.2 Binary Mode Rules

Binary commands ("Handles") are much faster since the values are not converted for human comprehension and less data needs to be transferred. They are expected to be sent with the correct number of parameters. Otherwise, an error message will be returned. The binary commands are two-byte words, and all the following parameters are four-byte double words. The command is executed when the device receives the expected amount of data for the command handle and all the parameters.

Binary data are sent from the PC in little endian format. That is the data is sent in chunks of 2 or 4 bytes with the least significant byte sent first. You can program the commands in decimal for sending from the PC. The 842-PE send data in big endian format, that is, the most significant byte comes first. You may need to convert to little endian depending on the software and computer you are using.

Binary command example (backlight ON):	Command	Parameter
Text mode	*BKL	1

Binary mode in decimal	1003		1			
	2 byte word		4 byte word			
Byte:	1st	2nd	1st	2nd	3rd	4th
in Hex, big endian	03	EB	00	00	00	01
as sent by PC in little endian	EB	03	01	00	00	00

Replies to binary commands are also in binary mode, and have a four-byte header and a variable amount of parameters. The header contains two words. The first word is the error indicator : 10= success, 11=error. The second word is an indicator of the size (in bytes) of the reply parameters or, in the case of an error, the error number.

An example of how you can use the binary commands is shown below in pseudocode.

Structure {	Definition of variables
WORD Handle	Reserves address space of a 2 byte word to store the variable Handle
DWORD ParameterA []	Reserves address space of one 4 byte word to store ParameterA. (4 byte word is a double word)
DWORD ParameterB [6]	Reserves address space of 6 double words to store an array of 6 parameters called ParameterB
} PackedData	
…	Later in the program
Handle = 1003	Assign the value for the Backlight command to Handle
ParameterA = 1	Assign to value for ON to the variable ParameterA
SendStringToSerialPort(PackedData, 6)	This routine transfers the data found at the address of structure PackedData to the serial port. 6 bytes used. .

Conversion of Values Transferred with Binary Commands

To prevent cross-platform floating-point conversion error all of the numerical values are transferred as integers. That means floating point values must be converted. The 842-PE meter multiplies the value and converts it from float to integer and then transfers it to you. As a result, you must convert and divide it by the same large number to obtain the original floating point value. **Unit Value** : Every value that needs to be adjusted as a floating point is transferred along with its divider. Therefore, 1.645 W would be transferred in two parts: the integers 1645 and 1000. Simply divide the value by its unit to obtain the original data.

7.3 Binary Command Reference

The following is just a summary, showing differences in the commands as they pertain to binary programming. For complete information on the various commands, see Section 4.2 in this manual.

Set Display

Binary Command	Parameters	Return

1157	Display Mode	ACK

Set Scale

Binary Command	Parameters	Return
1130	Scale identifier or index	ACK

Send the index of the identifier.

Scale Identifiers:

Binary Identifier	Scale
0	*optimum*
1	*1 picowatt or picojoule*
2	*3 picowatts or picojoules*
3	*10 picowatts or picojoules*
4	*30 picowatts or picojoules*
5	*100 picowatts or picojoules*
6	*300 picowatts or picojoules*
7	*1 nanowatt or nanojoule*
8	*3 nanowatts or nanojoules*
9	*10 nanowatts or nanojoules*
10	*30 nanowatts or nanojoules*
11	*100 nanowatts or nanojoules*
12	*300 nanowatts or nanojoules*
13	*1 microwatt or microjoule*
14	*3 microwatts or microjoules*
15	*10 microwatts or microjoules*
16	*30 microwatts or microjoules*
17	*100 microwatts or microjoules*
18	*300 microwatts or microjoules*
19	*1 milliwatt or millijoule*
20	*3 milliwatts or millijoules*
21	*10 milliwatts or millijoules*
22	*30 milliwatts or millijoules*
23	*100 milliwatts or millijoules*
24	*300 milliwatts or millijoules*
25	*1 Watt or Joule*
26	*3 watts or joules*
27	*10 watts or joules*
28	*30 watts or joules*
29	*100 watts or joules*
30	*300 watts or joules*

31	*1 kilowatt or kilojoule*
32	*3 kilowatts or kilojoules*
33	*10 kilowatts or kilojoules*
34	*30 kilowatts or kilojoules*
35	*100 kilowatts or kilojoules*
36	*300 kilowatts or kilojoules*
37	*1 megawatt or megajoule*
38	*3 megawatts or megajoules*
39	*10 megawatts or megajoules*
40	*30 megawatts or megajoules*
41	*100 megawatts or megajoules*
42	*300 megawatts or megajoules*

Set dBm Display

Binary Command	Parameters	Return
1159	**1** to turn On, **0** to turn Off	ACK

Set High Resolution Display

Binary Command	Parameters	Return
1161	**1** to turn On, **0** to turn Off	ACK

Query Current Value

Binary Command	Return
1200	Current value

In binary mode, 5 parameters are returned:

-the Current Value

-the Current Value's unit divider

-the Uncorrected Value (raw value before the multipliers and offsets)

-the Uncorrected Value's unit divider

-the current scale

Query New Value Ready

Binary Command	Return
1201	Available/ Not Available <CR> <LF> 1/0

Query Statistic Data

Binary Command	Return
1202	Statistics

In binary mode, the following structure is sent:

Current Value	This value should be divided by the Current Value Unit.
Current Value Unit	This is a divider
Maximum	This value should be divided by the Maximum Unit.
Maximum Unit	This is a divider
Minimum	This value should be divided by the Minimum Unit.
Minimum Unit	This is a divider
Average	This value should be divided by the Average Unit.
Average Unit	This is a divider
Standard Deviation	This value should be divided by the Standard Dev Unit.
Standard Dev Unit	This is a divider
RMS Stability	This value should be divided by 1000.
PTP Stability	This value should be divided by 1000.
Current Time In Period	Power measurement only. Default is 0.
Total Time of Period	Power measurement only. Default is 0.
Pulse Number	Energy measurement only. Default is 0.
Total Pulses	Energy measurement only. Default is 0.
Average Power	Energy measurement only. Default is 0. This value should be divided by the Avrg Power Unit
Avrg Power Unit	This is a divider
Repetition Rate	Energy measurement only. Default is 0. This value should be divided by the Rep Rate unit.
Rep Rate Unit	This is a divider
Uncorrected Value	This value should be divided by the Uncorrected Value Unit
Uncorrected Value Unit	This is a divider

Set Logging Start/Stop

Binary Command	Parameters	Return
1171	**0** to Stop **1** starts a raw data acquisition **2** starts saving statistics **3** saves both raw data and statistics	ACK

File Download

Binary Command	Parameters	Return
1172	File Sequence Number	File data

In binary mode, the reply parameters are:

-Size of the text header (in bytes)

-Size of the file's data (in bytes)

-Text header, read as a text string, size specified as parameter 1.

-File Data, read as a stream of DWORDs (4 byte chunks) You should keep receiving and saving data until the receipt of the correct amount (specified as parameter 2). Every DWORD read must be divided by the following DWORD. The file data is transferred in an interlaced fashion so that all data is followed by its Unit value.

The following example is for a file 400 bytes long with timestamps, and containing a 20 char text header.

Example	Response from 842-PE
Handle = 1172	`20, 180,` <20 letters Text Header>,
Parameter1 = 0	`1, 1(Tag, type 1),`
	`2,1000 (Time stamp, 0.002 second),`
	`01243, 1000000(Raw Value, 0.001243 watt),`
	`... (new Tag, loop until data size reached)`

Set Wavelength Correction

Binary Command	Parameters	Return
1125	Wavelength	ACK

Set Attenuator

Binary Command	Parameters	Return
1162	**1** to turn On, **0** to turn Off	ACK

Set Multipliers

Binary Command	Parameters	Return
1128	Multiplier **1** (or **2**), <Multiplier value>	ACK

In binary mode, the value should be multiplied by 10000, and converted into an integer (instead of a floating point value). This is to prevent any cross-platform floating-point conversion error.

The following example sets multiplier 2 equal to 3.3.

Example	Response from 842-PE
Handle = 1128	ACK
Parameter1 = 2	
Parameter2 = 33000	

Set Offsets

Binary Command	Parameters	Return
1129	Offset **1** (or **2**), <Offset value>	ACK

In binary mode, an extra parameter is required: the scale at witch the value is set. This is to prevent any cross-platform floating-point conversion error.

Example	Response from 842-PE
Handle = 1129	ACK
Parameter1 = 1	
Parameter2 = 15	
Parameter3= 17 (100u scale)	

Query Data Sampling Settings

Binary Command	Return
1151	Sampling Settings info

Binary mode returns numerical values in the following structure:

Binary Mode response:	
Sample Rate	Integer value of the sample rate.
Sample Rate Unit	**0** = Seconds **1** = Minutes **2** = Hours **3** = Days **4** = Percentage of Pulses Sampled
Sample Period	Integer value of the sample period.

Sample Period Unit	**0** = Seconds **1** = Minutes **2** = Hours **3** = Days **4** = Weeks **5** = Number of Pulses
Total Duration	Integer value of the total duration of sampling or statistics..
Total Duration Unit	**0** = One Sample Period **1** = Seconds **2** = Minutes **3** = Hours **4** = Days **5** = Weeks **6** = Continuous (loop when done) **7** = Predefined number of points
Timestamp	**0** = Off **1** = On

Configure Data Sampling

Binary Command	Parameters	Return
1152	Sample Rate, Sample Rate Unit, Sample Period, Sample Period Unit, Total Duration, Total Duration Unit, Time Stamp(On/Off)	ACK

The following example sets a single data acquisition run for 90 minutes with timestamps at 4 Hertz.

Example		Response from 842-PE
Binary Command:	Handle = 1152	ACK
	Parameter1 = 4	
	Parameter2 = 0	
	Parameter3 = 90	
	Parameter4 = 1	
	Parameter5 = 1	
	Parameter6 = 0	
	Parameter7 = 1	

Set Trigger Level

Binary Command	Parameters	Return
1112	Trigger Level (percentage)	ACK

In binary mode, the value must be multiplied by 1000 and sent as an integer.

Example		Response from 842-PE
Binary Command:	Handle = 1112 Parameter1 = 15400	ACK

Enable Statistics

Binary Command	Parameters	Return
1155	**0**, **1** or **2** (to Disable, Enable or Reset)	ACK

Set Energy Mode

Binary Command	Parameters	Return
1160	**1** to turn On, **0** to turn Off	ACK

Set Anticipation

Binary Command	Parameters	Return
1123	**1** to turn On, **0** to turn Off	ACK

Set Zero Offset

Binary Command	Parameters	Return
1120	**0** to turn Off, 1 to turn On, 2 to undo.	ACK

Query Version

Binary Command	Return
1001	Version number and device type.

The following example is for a hypothetical 842-PE version 1.2. There are four parameters in binary mode. In this case they would be:

Binary parameters	Example	
Header:		
Acknowledge	10	2 byte word
Length of transmission (excluding header)	16	2 byte word
Reply parameters:		
Version number	1	4 byte word
Version Extension	2	4 byte word
Length of Device name string	4	4 byte word
Device name string	842-PE	Text string in ASCII code

For this one example we show the binary response as the computer would see it.

Example		Response from 842-PE
Binary Command:	Handle = 1001	0 10 0 16 0 0 0 1 0 0 0 2 0 0 0 4 83 79 76 79

Translation:

Header: 0 10 0 16

0 10 = ACK
0 16 = 16 bytes following header

Reply parameters: 0 0 0 1 0 0 0 2 0 0
0 4 83 79 76 79

0 0 0 1 = version 1
0 0 0 2 = extension .2
0 0 0 4 = 4 characters coming
83 79 76 79 = ASCII code for "842-PE"

Query Detector Head Name

Binary Command	Return
1100	Model of the current head

The following example is for an 818E-05-25-S Energy Detector. There are four parameters in binary mode. In this case they would be:

Binary parameters	Example	
Header:		
Acknowledge	10	2 byte word
Length of transmission (excluding header)	11	2 byte word
Reply parameters:		
Length of Head name string	7	4 byte word
Detector model name	818E-05-25-S	7 bytes

Example		Response from 842-PE
Binary Command:	Handle = 1100	7 818E-05-25-S

Query Status

Binary Command	Return

1005	Current static and dynamic configuration values

Configuration values:

	Field name	Binary Mode Data
1	**Head Type**	1 = High Power Detectors 2 = Energy Detectors 3 = Low Power Detectors
2	**Head Version**	same
3	**Head Serial Number**	Size indicator. The Serial number string is located at the end of the binary data.
4	**Calibration Sensitivity**	This is specified in V/W for the Default Wavelength. Divide this value by 100000. [1]
5	**Default Wavelength**	same
6	**Active Sensitivity**	This is specified in V/W for the Active Wavelength. Divide this value by 100000.
7	**Active Wavelength**	same
8	**Scale Min Power (818P series) OR Max Power (818E series)**	same
9	**Scale Max Power (818P series) OR Max Energy (818E series)**	same
10	**Scale Min Energy**	same
11	**Scale Max Energy**	same
12	**Current Scale**	same
13	**Energy Mode**	1 = On , 0 = Off
14	**Anticipation**	1 = On , 0 = Off
15	**External Trig**	1 = On , 0 = Off
16	**Trig Level**	Integer number representing a percentage (from 1 to 100). Divide this value by 1000
17	**Zero Offset**	Divide this value by the Zero Offset Unit.
18	**Zero Offset Unit**	This is a divider
19	**Multiplier #1**	Divide this value by the Mult#1 Unit
20	**Mult #1 Unit**	This is a divider
21	**Offset #1**	Divide this value by the Offset#1 Unit .
22	**Offset #1 Unit**	This is a divider
23	**Multiplier #2**	Divide this value by the Mult#2 Unit.
24	**Mult #2 Unit**	This is a divider
25	**Offset #2**	Divide this value by the Offset#2 Unit.
26	**Offset #2 Unit**	This is a divider
27	**Currently Logging data**	1 = On , 0 = Off
28	**Analog Output**	1 = On , 0 = Off
29	**Resolution**	Divide this value by the Resolution Divider
30	**Resolution Divider**	This is a divider
31	**Currently Calculating Stats**	1 = On , 0 = Off
32	**High Resolution Display**	1 = On, 0 = Off
33	**Min Wavelength**	0 to 19
34	**Max Wavelength**	0 to 19
35	**Upper Bound**	Divide this value by the Upper Bound Unit

36	**Upper Bound Unit**	This is a divider
37	**Lower Bound**	Divide this value by the Lower bound Unit
38	**Lower Bound Unit**	This is a divider
39	**Reference Value**	Divide this value by the Reference Unit
40	**Reference Unit**	This is a divider
41	**Pass/Fail Status**	1= On, 0 = Off
42	**Threshold**	1 = Failed, 0 = Pass
43	**Autoscale query**	1= On, 0= Off
44	**DBM mode query**	1= On, 0= Off

Query Battery Power

Binary Command	Return
1006	1, 2 or 3 (one 4 byte double word)

Example		Response from 842-PE
Binary Command:	Handle = 1006	3 (as one 4 byte word in binary)

Set Internal Clock

Binary Command	Parameters	Return
1165	**day, month, year, hour, minute, second, AM/PM**	ACK

Set Backlight

Binary Command	Parameters	Return
1003	**1** to turn On, **0** to turn Off	ACK

Set Analog Output

Binary Command	Parameters	Return
1150	**1** to Enable, **0** to Disable	ACK

Test Communication

Binary Command	Return
1000	ACK

Init Serial Port

Binary Command	Parameters	Return
1004	new baud rate	ACK

Appendix A

Recycling and separation procedure.

This section is used by the recycling center when the monitor reaches its end of life. Breaking the calibration seal or opening the monitor will void the 842-PE warranty.
The complete instrument package contains:
1 Optical Power/Energy Meter
1 power supply (not manufactured by Newport)
1 USB cable
1Battery pack
1 User manual (CD ROM)
1 Start-Up Guide
1 Calibration certificate
1 Software (CD ROM)

Separation:

Paper : Quick start guide and certificate
Plastic: Instrument enclosure, LCD enclosure.
Wires: USB cable and power supply plug.
NimH batteries: inside the monitor.
Liquid crystal display: Less than 100 cm^2.
Printed circuit board: inside the monitor.

Dismantling procedure:

Remove the DB15 post using pliers
Remove the 4 screw on the bottom of the monitor using a Philips screwdriver.
Disconnect the Battery and LCD.
Remove the 4 screws that hold the LCD using a Philips screwdriver.

Internal #101246

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